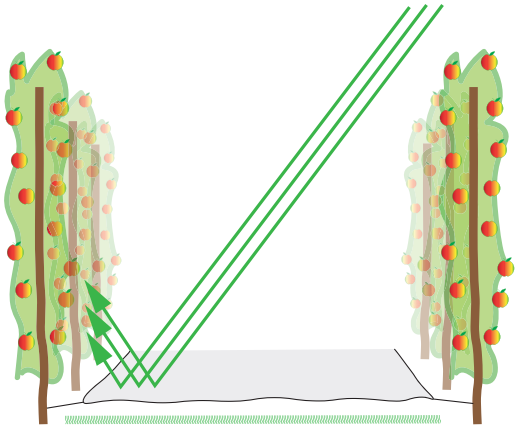
Cornell Cooperative Extension
Lake Ontario Fruit Program

Reflective Ground Cover For Coloring Apples At Harvest

Reflective ground cover has been used in fruit-growing regions for a number of years now. The Lake Ontario Fruit Team conducted a field trial in 2018 of reflective ground cover at two Wayne County farms.



Concept

Sunlight bounces up underneath lower, more shaded apples, increasing red color to greater than 50%.

Types and Configurations

- There are multiple types of reflective ground covers: White Fabric, White Film, & Metallic Film (Mylar®).
- The covers have different properties and effects. In the Wayne County study we looked at the physical and economic effects of white fabric ground cover.
- Additionally, covers can be set up in different configurations - in the herbicide strip, or between the tree rows. In this study we looked at covers spread between the tree rows.
- For harvest color effects, cover is installed 10 days to 3 weeks before harvest.
- One study (Toivonen et al. 2018) found negative storage effects from use of Mylar® but not white fabric. Our study did not look at storage effects.

Wayne County Study

- Installed in three blocks: Fuji, Minnieska, and Honeycrisp. 12-foot wide rows.
- Installed 10-foot wide (3 meter) white reflective fabric (Extenday) between the tree rows.
- Results from these rows were compared with rows without reflective materials.
- Fruit was harvested and individual apples were graded with an electronic fruit color sorter.
- Individual fruit with greater than 50% red color were classified as Extra Fancy Grade.

Conclusions

- May increase Extra Fancy Grade as much as 20%.
- May increase yield of Extra Fancy Grade.
- May reduce number of picks for multi-pick varieties, resulting in labor cost savings. May increase Extra Fancy Grade yield of first pick.
- Approximately 95% of the apples harvested from the trees with reflective material were classified by the sorter as Extra Fancy Grade.
- A range of 49% to 74% of apples from trees without reflective materials were classified as Extra Fancy Grade on average (the experimental control).

Reflective Ground Covers Suppliers

White Reflective Fabric:

- Extenday - extenday.com
- ProLine - prolineproducts.co.nz

White Film:

- Direct from Wholesaler - Peck Babcock pfbdcb@ix.netcom.com

Metallic Film (Mylar®):

- Brite-N'Up & Other Brands - Multiple suppliers

CCE Educational Note

CCE does not endorse or recommend any specific product or service. This program is solely intended to educate consumers about their choices.

Contact

For questions, contact Mark Wiltberger, CCE LOF Business Management Specialist, mw883@cornell.edu.

Financial Assumptions

Financial estimates were made assuming white fabric lasting seven years. White films and metallic films are much lower costs but usually disposed of after one season. White fabrics can also be rotated from early- to mid- to late-harvest varieties, lowering per-acre investment.

Costs of Installing and Maintaining

Initial Investment:	
Spooler - farm-built - One-time cost:	$2000
Storage - need a place to store off-season:	Varies
Annual Costs:	
Reflective material - $2500 / 7 years:	$358/acre
Labor - install/remove:	$150/acre
Annual cost:	**$508/acre**

Note: If material is rotated from early- to mid- to late-harvest varieties, estimate of material cost can be divided by the number of uses per season.

Economic Revenue

Approximate increase in revenue for orchard yield of 1000 bu/acre and average return of $10/bu.:

% Increase in Extra Fancy Grade	Increase in Revenue
↑ 5%:	↑ $500/acre
↑ 10%:	↑ $1000/acre
↑15%:	↑ $1500/acre
↑ 20%:	↑ $2000/acre

For the approximate return on investment, subtract the annual costs at top from the approximate increase in revenue here.

References

Toivonen, P. M., Lu, C., & Stoochnoff, J. (2018). Post-harvest quality implications of preharvest treatments applied to enhance Ambrosia™ apple red blush colour at harvest. Canadian Journal of Plant Science, 99(1), 40-49. https://tspace.library.utoronto.ca/bitstream/1807/93623/1/cjps-2018-0193.pdf

Schmidt, T., McFerson, J., Auvil, T., Castillo, & F., Hanrahan, I. Horticultural Benefits of Reflective Materials. https://www.treefruitresearch.com/images/stories/2010ReflectivesWebShow.pdf