



AgriSun Solutions pty ltd

SCIENTIFIC RESEARCH COMPENDIUM

Reflective Orchard Ground Covers

Selected published research
relevant to orchard light
management, application
timing, crop response,
protective netting and
sunburn

1. PURPOSE OF THIS COMPENDIUM

This document summarises selected scientific research relevant to reflective orchard ground-cover technology.

The purpose is not to imply that every research result applies directly to AgriSun Reflective Orchard Film.

Different studies have used different:

- reflective materials,
- crops,
- cultivars,
- deployment periods,
- orchard architectures,
- climates,
- and experimental objectives.

For each study this compendium therefore identifies:

Study

Country

Crop / cultivar

Reflective material

Application timing

What was measured

What was found

What was not found / not established

DOI

Evidence status

2. HOW TO READ THE EVIDENCE

DIRECTLY RELEVANT

Research directly involving reflective material deployed on the orchard floor.

RELATED TECHNOLOGY

Research relevant to the scientific question but using a different technology, such as kaolin particle film applied to the fruit/tree.

SUPPORTING PHYSIOLOGY

Research explaining mechanisms such as fruit-surface temperature or sunburn but not evaluating reflective ground film.

EVIDENCE GAP

A crop or cultivar for which this audit did not identify sufficiently strong directly applicable research to support an AgriSun performance or timing statement.

APPLES

STUDY A1 — GALA

Study

Layne, D.R., Jiang, Z. & Rushing, J.W. (2002).

The Influence of Reflective Film and ReTain on Red Skin Coloration and Maturity of ‘Gala’ Apples.

HortTechnology, 12(4), 640–645.

Country

United States — South Carolina.

Crop / Cultivar

Apple — Gala / Imperial Gala.

Reflective Material

Metallised high-density polyethylene reflective film.

Application Timing

4 WEEKS BEFORE ANTICIPATED FIRST HARVEST

The film was deployed four weeks before the anticipated start of harvest.

What Was Measured

- red skin coloration,
- fruit maturity,
- treatment response with reflective film,
- interaction with aminoethoxyvinylglycine / ReTain.

What Was Found

Reflective film increased red skin coloration under the experimental conditions. The study also evaluated maturity-related responses independently from colour.

What Was NOT Established

The study does **not** establish:

- four weeks as universally optimal for every Gala orchard,
- that every fruit-quality variable improves,
- that the same timing applies to Fuji, Cripps Pink or other apples,
- or that AgriSun will reproduce the same commercial result.

DOI

10.21273/HORTTECH.12.4.640

Evidence Status

DIRECTLY RELEVANT

STUDY A2 — FUJI

Study

Ju, Z., Duan, Y. & Ju, Z. (1999).

Effects of Covering the Orchard Floor with Reflecting Films on Pigment Accumulation and Fruit Coloration in ‘Fuji’ Apples.

Scientia Horticulturae, 82, 47–56.

Country

China.

Crop / Cultivar

Apple — Fuji.

Reflective Material

Reflective orchard-floor films, including foil/metalised reflective material.

Application Timing

Pre-harvest orchard-floor treatment.

The research source confirms reflective material was deployed on the orchard floor, but this compendium does **not** assign a universal Fuji timing from the study because a single transferable commercial timing is not established by the evidence reviewed.

What Was Measured

- anthocyanin accumulation,
- chlorophyll degradation,
- fruit skin coloration,
- pigment-related responses.

What Was Found

Covering the orchard floor with reflective films stimulated anthocyanin accumulation and chlorophyll degradation and improved Fuji fruit coloration under the experimental conditions.

What Was NOT Established

The study does not establish:

- one universal Fuji deployment date,
- that colour response equals improved Brix,
- improved yield,
- or identical response among Fuji strains.

DOI

10.1016/S0304-4238(99)00038-2

Evidence Status

DIRECTLY RELEVANT

STUDY A3 — MONDIAL GALA

Study

Iglesias, I. & Alegre, S. (2009).

The Effects of Reflective Film on Fruit Color, Quality, Canopy Light Distribution, and Profitability of ‘Mondial Gala’ Apples.

HortTechnology, 19, 488–498.

Country

Spain.

Crop / Cultivar

Apple — Mondial Gala.

Reflective Material

Reflective orchard film.

Application Timing

Pre-harvest deployment.

What Was Measured

- fruit colour,
- fruit quality,
- canopy light distribution,
- economic / profitability response.

What Was Found

Reflective film increased light availability in the canopy and improved red skin coloration under the experimental conditions. The study also evaluated commercial economics rather than colour alone.

What Was NOT Established

The study does not establish:

- a universal profit outcome,
- that all apple cultivars respond identically,
- or that increased light guarantees increased yield or Brix.

DOI

10.21273/HORTTECH.19.3.488

Evidence Status

DIRECTLY RELEVANT

STUDY A4 — HONEYCRISP UNDER PROTECTIVE NETTING

Study

Mupambi, G. et al. (2021).

Reflective Groundcover Improves Fruit Skin Color in ‘Honeycrisp’ Apples Grown under Protective Netting.

HortTechnology, 31(5), 607–614.

Country

United States — Washington State.

Crop / Cultivar

Apple — Honeycrisp.

Reflective Material

Reflective orchard groundcover beneath protective netting.

Application Timing

Pre-harvest / late-season deployment under a protected orchard system.

The study supports pre-harvest use but should not be converted into one universal Honeycrisp timing without reproducing the exact experimental protocol.

What Was Measured

- fruit skin colour,
- orchard light environment,
- yield,
- fruit weight,
- firmness,
- soluble solids.

What Was Found

Reflective groundcover improved fruit skin red coloration under protective netting.

What Was NOT Found

The treatment did **not** significantly affect:

- yield,
- fruit weight,
- firmness,
- or soluble solids

under the study conditions.

This is an important example of a **colour response without a universal fruit-quality response**.

Evidence Status

DIRECTLY RELEVANT

STUDY A5 — REFLECTIVE MATERIAL, POSITION & TRAINING SYSTEM

Study

Gonzalez, L. & Robinson, T.L. (2023).

Effect of Different Reflective Ground Covers on Light Reflection and on the Coloring of Apples at Harvest.

Acta Horticulturae 1366.

Country

United States — New York.

Crop / Cultivar

Commercial apple systems.

Reflective Material

Multiple reflective ground-cover materials and deployment configurations.

Application Timing

Pre-harvest orchard deployment.

What Was Measured

- reflected light,
- canopy-light interception,
- material differences,
- deployment configuration,
- orchard training system,

- fruit colour.

What Was Found

Material type and deployment configuration influenced reflected light and canopy interception.

Orchard training system also influenced the useful light response.

What Was NOT Established

A laboratory reflectivity value does **not** establish how much light reaches fruit in a commercial orchard.

The study therefore does not support a statement such as:

“94% reflective means 94% of sunlight reaches the fruit.”

DOI

10.17660/ActaHortic.2023.1366.47

Evidence Status

DIRECTLY RELEVANT

PEARS

STUDY P1 — COMMERCIAL PEAR ORCHARDS

Study

Orpet, R.J. et al. (2023).

Evaluation of Reflective Groundcovers for Pest and Fruit Quality Management in Commercial Pear Orchards.

Journal of Applied Entomology.

Country

United States — Washington State.

Crop / Cultivar

Commercial pear orchards including Bartlett and Anjou.

Reflective Material

The experiments included reflective fabric and metallised polyethylene groundcover.

Application Timing

Commercial orchard deployment.

The study was not designed as a simple short pre-harvest colour-timing experiment, so no universal “X weeks before harvest” recommendation should be extracted from it.

What Was Measured

- pear psylla,
- biological control,
- fruit size,
- fruit weight,
- sunburn,
- pest mites,
- fruit-quality variables.

What Was Found

The reflective groundcover systems were compatible with pear psylla biological control and were evaluated as both pest- and orchard-management tools.

What Was NOT Found

Reflective groundcovers did **not** significantly affect:

- fruit size,
- fruit weight,
- sunburn,
- or pest-mite abundance

in the reported experiments.

DOI

10.1111/jen.13123

Evidence Status

DIRECTLY RELEVANT

STUDY P2 — APPLE & PEAR FIELD TRIAL PROGRAMME

Study

Hanrahan, I., Schmidt, T.R., Castillo, F. & McFerson, J.R.

Reflective Ground Covers Increase Yields of Target Fruit of Apple and Pear.

Acta Horticulturae 903.

Country

United States — Washington State.

Crop / Cultivar

Commercial apple and pear orchards.

Reflective Material

Reusable reflective ground-cover materials.

Application Timing

Timing varied according to the field experiments and orchard objective.

It should not be represented as one universal pear pre-harvest programme.

What Was Measured

- crop yield,
- target fruit,
- fruit size,
- orchard productivity,
- responses to reflective-ground-cover deployment.

What Was Found

The Washington research programme reported increases in target fruit yield in some apple and pear trials.

What Was NOT Established

The study does not demonstrate that:

- all pear cultivars increase yield,
- every reflective material performs identically,
- or short pre-harvest deployment is appropriate for every pear.

DOI

10.17660/ActaHortic.2011.903.152

Evidence Status

DIRECTLY RELEVANT

SWEET CHERRIES

STUDY C1 — REGINA

Study

Muñoz-Alarcón, A., Palacios-Peralta, C., González-Villagra, J., Carrasco-Catricura, N., Osorio, P. & Ribera-Fonseca, A. (2025).

Impact of Reflective Ground Film on Fruit Quality, Condition, and Post-Harvest of Sweet Cherry (*Prunus avium* L.) cv. Regina Cultivated Under Plastic Cover in Southern Chile.

Agronomy, 15(3), 520.

Country

Chile.

Crop / Cultivar

Sweet cherry — Regina.

Orchard System

Commercial orchard under plastic cover.

Reflective Material

Reflective ground film positioned beside the tree rows.

Application Timing

21 DAYS BEFORE HARVEST

and

34 DAYS BEFORE HARVEST.

What Was Measured

- fruit size/calibre,
- skin colour,
- firmness,
- total soluble solids,
- cracking,
- pedicel condition,
- canopy position,
- post-harvest quality and defects.

What Was Found

The study reported increased firmness and TSS overall with reflective film.

The 21-day treatment produced useful responses in specific canopy positions, including fruit-size and colour-related outcomes.

What Was NOT Found / Trade-offs

Longer exposure was **not universally better**.

The study reported negative condition responses, including increased cracking and differences in pedicel/post-harvest condition.

Therefore neither 21 nor 34 days should be marketed as universally optimal.

DOI

10.3390/agronomy15030520

Evidence Status

DIRECTLY RELEVANT

PEACHES

STUDY PE1 — MULTI-CULTIVAR COMMERCIAL RESEARCH

Study

Layne, D.R., Jiang, Z. & Rushing, J.W. (2001).

Tree Fruit Reflective Film Improves Red Skin Coloration and Advances Maturity in Peach.

HortTechnology, 11(2), 234–242.

Country

United States — South Carolina.

Crop / Cultivar

Seven commercial peach cultivars.

Reflective Material

Metallised reflective plastic film.

Application Timing

2–4 WEEKS BEFORE ANTICIPATED FIRST HARVEST.

Film was installed as strips on both sides of the tree rows.

What Was Measured

- red skin coloration,
- fruit maturity,
- fruit quality,
- canopy / reflected radiation response.

What Was Found

Reflective-film treatments increased red skin coloration across the tested peach cultivars.

Maturity-related responses were also observed.

What Was NOT Established

The research does not establish:

- one exact timing for every peach cultivar,
- identical response across cultivars,
- or that every fruit-quality characteristic improves.

DOI

10.21273/HORTTECH.11.2.234

Evidence Status

DIRECTLY RELEVANT

STUDY PE2 — TAIKO

Study

Lee, D.B., Lee, G.J., You, Y.J., Ahn, S.Y. & Yun, H.K. (2021).

Reflective Film Mulching Before Harvest Promotes Coloration and Expression of Ripening-Related Genes in Peach Fruits.

Horticultural Science and Technology, 39(3), 324–331.

Country

South Korea.

Crop / Cultivar

Peach — Taiko.

Reflective Material

Reflective film positioned beneath the tree canopy.

Application Timing

7 DAYS BEFORE HARVEST.

What Was Measured

- canopy PAR,
- fruit skin colour,
- total soluble solids,
- titratable acidity,
- firmness,
- anthocyanin-related gene expression,
- ripening-related gene expression.

What Was Found

Reflective-film mulching:

- increased light irradiance / PAR within the canopy,
- significantly improved measured skin coloration,
- and upregulated anthocyanin-biosynthesis-related genes.

What Was NOT Found

There were no significant differences in:

- total soluble solids,
- acidity,
- or firmness.

Ripening-related gene expression was also not enhanced in the same way as anthocyanin-related genes.

DOI

10.7235/HORT.20210029

Evidence Status

DIRECTLY RELEVANT

NECTARINES

STUDY N1 — WASHINGTON

TREE-FRUIT REFLECTIVE-

GROUND COVER PROGRAMME

Study

Schmidt, T., Hanrahan, I., Castillo, F. & McFerson, J. (2014).

Reflective Ground Covers Increase Yields of Fruit Trees.

Acta Horticulturae 1058.

Country

United States — Washington State.

Crop / Cultivar

The programme included:

- apples,
- pears,
- sweet cherries,
- peaches,
- and nectarines.

Reflective Material

Treatments included reusable woven white polyethylene reflective groundcovers and silver reflective material.

Application Timing

Varied across more than 50 replicated commercial field trials.

Important

The source does **not** provide a single nectarine-specific timing that AgriSun should publish.

What Was Measured

Across the broader programme:

- yield,
- fruit size,

- fruit set,
- red skin colour,
- commercial fruit value.

What Was Found

The overall research programme reported favourable yield/value and colour responses in several fruit crops.

What Was NOT Established

The published summary does **not** allow AgriSun to isolate:

- one nectarine cultivar,
- one nectarine timing,
- or one guaranteed nectarine response.

Therefore the research confirms **nectarine inclusion in reflective-ground-cover research**, but not a universal nectarine programme.

DOI

10.17660/ActaHortic.2014.1058.37

Evidence Status

**DIRECTLY RELEVANT, BUT
CULTIVAR-SPECIFIC EVIDENCE
LIMITED**

PLUMS

STUDY PL1 — PRE-HARVEST TIMING

Study

Kim, E.J., Choi, D.G. & Jin, S.N. (2008).

**Effect of Pre-Harvest Reflective Mulch on Growth and Fruit Quality of Plum
(*Prunus domestica* L.).**

Acta Horticulturae 772.

Country

South Korea.

Crop / Cultivar

European plum (*Prunus domestica*).

Reflective Material

Reflective mulch.

Application Timing

Four treatments were compared:

1 WEEK BEFORE HARVEST

2 WEEKS BEFORE HARVEST

3 WEEKS BEFORE HARVEST

4 WEEKS BEFORE HARVEST.

What Was Measured

- orchard light intensity,
- fruit growth,
- soluble solids,
- fruit quality,
- marketable-fruit response.

What Was Found

Reflective mulch increased measured light intensity.

Among the timings evaluated, the **three-week treatment produced the strongest overall fruit-quality result in that experiment.**

What Was NOT Established

The study does not establish:

- three weeks as universally optimal,
- the same timing for Angeleno, Laetitia, Fortune, Songold or Sapphire,
- or a guaranteed commercial response under South African conditions.

DOI

10.17660/ActaHortic.2008.772.54

Evidence Status

DIRECTLY RELEVANT

CITRUS

STUDY CI1 — CLEMENPONS CLEMENTINE

Study

Mesejo, C., Gambetta, G., Gravina, A., Martínez-Fuentes, A., Reig, C. & Agustí, M. (2012).

Relationship Between Soil Temperature and Fruit Colour Development of ‘Clemenpons’ Clementine Mandarin.

Journal of the Science of Food and Agriculture, 92(3), 520–525.

Country

Spain — Valencia.

Crop / Cultivar

Clementine mandarin — Clemenpons.

Reflective Material

White reflective plastic mulch.

Application Timing

This study is frequently misunderstood.

The researchers reported that major treatment differences became established approximately:

70–30 DAYS BEFORE HARVEST.

This is NOT a 70-day installation recommendation.

It describes when major differences in reflected light and soil-temperature conditions between treatments occurred.

What Was Measured

- soil temperature,
- soil-temperature range,
- reflected light,
- rind colour development,
- timing of colour break,
- first-pick response.

What Was Found

Reflective white mulch:

- increased reflected light,
- reduced maximum soil temperature,
- reduced daily soil-temperature range,
- and advanced rind colour break in the experimental system.

The treated trees reached colour break earlier, and the study reported a greater proportion of fruit at the first picking.

What Was NOT Established

The study does not establish:

- “install film 70 days before harvest,”
- the same response in Nadorcott, Tango or Nova,
- or a universal citrus timing programme.

DOI

10.1002/jsfa.4600

Evidence Status

DIRECTLY RELEVANT TO REFLECTIVE MULCH — MATERIAL AND OBJECTIVE DIFFER FROM AGRISUN'S METALLISED FILM

STUDY CI2 — LEMON & HASSAKU

Study

Akasaka, S., Ikeda, H., Watanabe, Y. & Kohmura, H. (2008).

Effects of Reflective Sheet Mulch on Antioxidant Activity, Ascorbic Acid Levels and Fruit Quality in Lemon and Hassaku Fruit.

Bulletin of the Hiroshima Prefectural Technology Research Institute Agricultural Technology Research Center, 83, 11–16.

Country

Japan.

Crop / Cultivar

Lemon and Hassaku citrus.

Reflective Material

Reflective sheet mulch.

Application Timing

Seasonal orchard treatment.

The source reviewed does not establish one universal Eureka/Lisbon pre-harvest timing.

What Was Measured

- reflected illumination,
- leaf water potential,
- fruit weight,
- soluble solids,
- citric acid,
- rind colour,
- antioxidant activity,
- ascorbic acid.

What Was Found

The reflective mulch substantially changed the light environment.

Reflected illumination on the south side of treated trees at noon was approximately **20 klx**, about one-quarter of direct sky illumination in the study.

The treatment also increased Hassaku rind colour, antioxidant activity in Hassaku flesh, and ascorbic acid concentration in lemon peel.

What Was NOT Found

There was **no significant difference** at harvest in:

- fruit weight,
- soluble-solids content,
- or citric-acid content.

Leaf water potential also did not differ significantly between treatment and control.

DOI

10.82682/hitriatrc.83.0_11

Evidence Status

DIRECTLY RELEVANT

MANGO

CURRENT EVIDENCE STATUS

Direct reflective orchard-ground-film study
verified in this audit

NONE STRONG ENOUGH TO INCLUDE AS A MANGO APPLICATION STUDY

During this source audit, I did **not** identify a sufficiently strong directly applicable peer-reviewed study of reflective orchard ground film in commercial mango production that would justify an AgriSun timing or performance statement.

This is important.

What This Means

AgriSun should currently classify mango as:

SOUTH AFRICAN RESEARCH / TRIAL PRIORITY

rather than:

ESTABLISHED RESEARCH APPLICATION.

What AgriSun Should NOT Claim

Until stronger evidence is verified, AgriSun should not state that research proves reflective ground film will:

- improve mango colour,
- increase mango Brix,
- increase fruit size,
- reduce sunburn,
- advance maturity,
- or improve pack-out.

What a South African Trial Should Measure

- reflected PAR,
- fruit-surface temperature,
- skin colour where relevant,
- sunburn,
- fruit weight,
- soluble solids,
- maturity,
- external defects,
- pack-out.

DOI

Not applicable — evidence gap.

Evidence Status

EVIDENCE GAP / LOCAL TRIAL REQUIRED

This is an important correction to any earlier AgriSun material that loosely described mango as an established reflective-ground-film research crop.

REFLECTIVE FILM UNDER NETS

STUDY NET1 — HAIL NETS, GERMANY

Study

Blanke, M.M.

Can Reflective Ground Cover Compensate for Light Losses Under Hail Nets?

Acta Horticulturae 732.

Country

Germany.

Crop / Cultivar

Apple — Jonagold Wilmuta.

Reflective Material

Reflective ground cover over orchard alleys beneath black and white hail nets.

Application Timing

Pre-harvest treatment.

Earlier deployment produced a stronger colour response than later deployment in the experiment.

What Was Measured

- orchard light,
- diffuse/reflected light,
- fruit coloration,
- fruit size,
- firmness,
- starch breakdown,
- sugar content.

What Was Found

Reflective ground cover increased useful reflected light and improved fruit coloration, particularly on shaded fruit and shaded portions of fruit.

What Was NOT Found

Fruit size, firmness, starch breakdown and sugar content were mostly unaffected.

Therefore improved coloration did not mean every maturity or quality variable improved.

DOI

10.17660/ActaHortic.2007.732.101

Evidence Status

DIRECTLY RELEVANT

STUDY NET2 — REFLECTIVE MATERIAL UNDER HAIL NETS

Study

Meinhold, T., Damerow, L. & Blanke, M. (2011).

Reflective Materials Under Hailnet Improve Orchard Light Utilisation, Fruit Quality and Particularly Fruit Colouration.

Scientia Horticulturae, 127, 447–451.

Country

Germany.

Crop

Apple.

Reflective Material

Reflective materials deployed beneath hail netting.

Application Timing

Pre-harvest / orchard colour-development period.

What Was Measured

- orchard light utilisation,
- fruit colour,
- fruit quality,
- responses beneath hail netting.

What Was Found

Reflective materials improved light utilisation beneath hail net and particularly enhanced fruit coloration.

What Was NOT Established

The study does not establish:

- that reflective material replaces hail net,
- a universal application timing,
- or identical response under all net colours and shade factors.

DOI

10.1016/j.scienta.2010.09.006

Evidence Status

DIRECTLY RELEVANT

STUDY NET3 — CHILE: SHADE NET + REFLECTIVE MULCH

Study

Yuri, J.A., Sepúlveda, A., Moya, M., Simeone, D. & Fuentes, M.

**Shade Netting and Reflective Mulches Effect on Yield and Quality Variables of
'Gala Baigent' and 'Fuji Raku Raku' Apples.**

New Zealand Journal of Crop and Horticultural Science.

Country

Chile.

Crop / Cultivar

Apple:

- Gala Baigent,
- Fuji Raku Raku.

Reflective Material

Reflective mulch used alone and beneath shade netting.

Treatments

- control,
- shade net,
- reflective mulch,
- shade net + reflective mulch.

What Was Measured

- transmitted PAR,
- reflected PAR,
- fruit colour,
- sunburn,
- yield,
- fruit maturity,
- return bloom,
- shoot growth.

What Was Found

The shade net reduced transmitted PAR.

Reflective mulch substantially increased measured reflected PAR compared with the grass-row control.

Shade netting reduced sunburn, while also reducing fruit coloration—particularly in Fuji.

Adding reflective mulch beneath the net increased the proportion of fruit reaching the study's premium-colour category.

What Was NOT Found

The study found no treatment effects on:

- yield,
- fruit maturity,
- return bloom,
- or shoot length.

It therefore does not support universal yield or maturity claims.

Critical Claims Distinction

The large sunburn reduction reported in this research was associated with **shade netting**.

It must **not** be presented as a reflective-film sunburn result.

DOI

10.1080/01140671.2022.2098347

Evidence Status

DIRECTLY RELEVANT

SUNBURN

**STUDY S1 — SOUTH AFRICAN
APPLE SUNBURN / KAOLIN**

Study

Wand, S.J.E., Theron, K.I., Ackerman, J. & Marais, S.J.S. (2006).

Harvest and Post-Harvest Apple Fruit Quality Following Applications of Kaolin Particle Film in South African Orchards.

Scientia Horticulturae, 107(3), 271–276.

Country

South Africa — Western Cape.

Crop / Cultivars

Apple:

- Granny Smith,
- Braeburn,
- Fuji,
- Royal Gala,
- Cripps Pink.

Material

KAOLIN PARTICLE FILM

applied to tree / fruit surfaces.

This was NOT reflective orchard ground film.

Application Timing

Kaolin spray programme during fruit development.

What Was Measured

- apple sunburn,
- fruit quality,
- cultivar response,
- harvest and post-harvest characteristics.

What Was Found

The study demonstrated that sunburn response under Western Cape conditions is cultivar dependent.

Kaolin treatment reduced sunburn in some cultivar/treatment situations.

What Was NOT Established

This research provides **no direct evidence that AgriSun reflective ground film prevents sunburn.**

Kaolin works on the fruit/tree surface.

AgriSun works from the orchard floor.

The technologies must not be conflated.

DOI

10.1016/j.scienta.2005.11.002

Evidence Status

RELATED TECHNOLOGY — NOT AGRISUN GROUND FILM

STUDY S2 — APPLE SUNBURN PHYSIOLOGY

Study

Schrader, L.E., Zhang, J. & Duplaga, W.K. (2001).

Two Types of Sunburn in Apple Caused by High Fruit Surface (Peel) Temperature.

Plant Health Progress.

Country

United States.

Crop

Apple.

Reflective Material

None.

This is a physiology study, not a reflective-film study.

Application Timing

Not applicable.

What Was Measured

The relationship between:

- fruit-surface temperature,
- solar exposure,
- sunburn browning,
- sunburn necrosis.

What Was Found

The research distinguished:

SUNBURN BROWNING

from

SUNBURN NECROSIS.

Sunburn browning was associated with high fruit-surface temperature in the presence of solar radiation, while still higher fruit-surface temperatures caused necrotic injury.

What Was NOT Established

The reported temperatures must **not** be turned into:

- a universal AgriSun film-removal temperature,
- a universal air-temperature threshold,
- or evidence that reflective ground film causes or prevents sunburn.

DOI

Evidence Status

SUPPORTING PHYSIOLOGY

3. EVIDENCE SUMMARY BY CROP

Crop / topic	Direct evidence strength	What is reasonably established
Apples	Strong	Reflective ground covers can alter canopy light and improve red coloration in specific cultivars/systems Commercial reflective-ground-cover research exists; objectives include
Pears	Moderate	yield, fruit quality and pest management
Sweet cherry	Strong for Regina	21- and 34-day treatments directly studied under plastic cover in Chile 2–4-week commercial programmes
Peach	Strong	and 7-day Taiko treatment directly studied
Nectarine	Limited/moderate	Included in replicated reflective-ground-cover research, but cultivar-specific timing remains weak
Plum	Useful direct timing evidence	1–4-week timings compared; 3-week treatment strongest in that experiment
Citrus	Moderate, crop-specific	Clementine and lemon/Hassaku research demonstrates light/thermal

Crop / topic	Direct evidence strength	What is reasonably established
		responses; universal timing not established
Mango	Insufficient	No directly verified ground-film study strong enough in this audit to support an AgriSun performance/timing claim
Under nets	Strong in apples	Netting changes PAR; reflective ground cover can increase reflected light and improve colour under specific systems
Sunburn	Strong physiology, indirect for AgriSun	Fruit-surface temperature and solar radiation matter; kaolin research must not be confused with ground-film research

4. THE MOST IMPORTANT SCIENTIFIC LESSONS

The literature does **not** support one universal statement that reflective orchard film:

increases colour, Brix, size, yield and pack-out.

Instead, the research shows a more interesting pattern.

LIGHT RESPONSE

This is the most consistent physical response.

Reflective ground surfaces can change the orchard light environment.

COLOUR RESPONSE

Improved skin coloration has been repeatedly reported in specific apple, peach and cherry systems.

BRIX / SOLUBLE SOLIDS

Results are **not consistent**.

For example, Taiko peach showed improved colour without a significant TSS response, while the Regina cherry study reported increased TSS under its conditions.

FRUIT SIZE

Results are also not universal.

The commercial pear study found no effect on fruit size or weight, while specific fruit-size distribution effects occurred in Regina cherry.

SUNBURN

Reflective ground film should not be marketed as a sunburn treatment.

Protective netting has direct sunburn-management evidence, while the South African kaolin study concerns a different technology.

TIMING

Timing is clearly crop- and cultivar-dependent.

Published treatments range from **7 days in Taiko peach** to **four weeks in Gala**, **21/34 days in Regina cherry**, and multiple timing treatments in plums.

5. WHAT THIS COMPENDIUM DOES NOT DO

This document does not:

- certify AgriSun product performance,
- establish one universal installation timing,
- claim that materials used in every study are identical to AgriSun film,
- guarantee crop responses,
- or replace local orchard evaluation.

Its purpose is to show **what the scientific record actually supports.**

6. AGRISUN RESEARCH RULE

DO NOT TURN A STUDY RESULT INTO A PRODUCT GUARANTEE.

Instead:

State the cultivar.

State the country.

State the material.

State the treatment.

State what was measured.

State what changed.

State what did not change.

State the limitations.

That should be the standard for every AgriSun research reference.

AGRISUN REFLECTIVE SOLUTIONS

Better Light. Applied With Evidence.

The strongest evidence is not the study that reports the biggest benefit.

It is the study we report accurately — including the results that did not change.

AgriSun distinguishes between evidence for a horticultural principle and evidence for a specific product. Published research using reflective orchard ground covers may support the scientific principle that orchard-floor reflectivity can alter the orchard light environment. Unless AgriSun Reflective Orchard Film itself was used in the experiment, the study should not be represented as product-specific performance evidence