

Protect Your Crops When Temperatures Soar

HOW CROPSHADER ORCHARD HELPED ORCHARD GROWERS SAVE MORE YIELD IN HOT SUMMERS

SMART SHADING, STRONGER CROPS

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Cropshader Orchard: protecting fruit in hot summers

Every year, more orchards experience temperatures around 35 °C on clear summer days, and fruit and leaf temperatures often rise above the ambient temperature, causing plants to close their stomata, which decreases photosynthetic activity. Just one hot week can quietly turn a promising season into damaged fruit, softer quality, and a larger share of lower-grade produce than expected.

In this whitepaper, you'll see how Cropshader Orchard performed in apples, pears, walnuts, olives and citrus in France, Turkey, Spain and the Netherlands, and how those growers achieved cooler fruit, less sunburn and more Class I yield with a starch-based reflective coating. These results directly address the questions growers face every hot season:

- *How can I keep my fruit and trees cooler so I cut down heat damage and sunburn in hot summers?*
- *If I manage to lower fruit and leaf temperature a few degrees, what does that actually mean for sunburn losses and tree stress at harvest?*
- *What options do I really have for heat and sunburn protection across apples, pears, walnuts, olives and citrus, and what are the tradeoffs in cost, labour and flexibility?*
- *How can I test a new product or method in a small block and evaluate the results properly before I spend serious money across the orchard?*



We are here to help growers and their consultants navigate hotter seasons with confidence, and in this whitepaper, we answer these questions using real orchard results so you can judge Cropshader Orchard for yourself

What you will find in this report

Rising temperatures and harsher summers are already putting pressure on your orchards. If you are reading this, you know that heat and sunburn are getting worse, not better, and that every loss in marketable yield has a direct impact on your margins.

What you need now is a solution that protects your fruit better than what you are using today, without adding complexity to your season. Cropshader Orchard is a biobased reflective coating designed exactly for that: to help keep more fruit in Class I and take some pressure off your orchards when the heat hits.

This whitepaper brings together several Cropshader Orchard field trials carried out in real orchards and test gardens:

1. **APPLES AND PEARS**
   Verger de Poisy, France
   Cropshader Orchard clearly reduced leaf burn on Conference pears and cut sunburn on Suntan and Elstar apples by around 70% compared with the untreated control, outperforming standard kaolin clay.[1]

2. **WALNUTS CHANDLER**
   Turkey
   Coated trees ran about 5 °C cooler at the fruit surface than non-coated trees, and daytime photo-synthetic activity was roughly 15% higher during a hot spell.[2]

3. **APPLES, GRANNY SMITH,**
   Turkey
   Average fruit and leaf temperatures with Cropshader Orchard trees were almost 5 °C lower than on the control trees in the same block.[3]

4. **OLIVES, HOJIBLANCA**
   Spain
   Coated trees showed around 4–5 °C lower fruit and leaf temperatures under strong Mediterranean sunshine.[4]

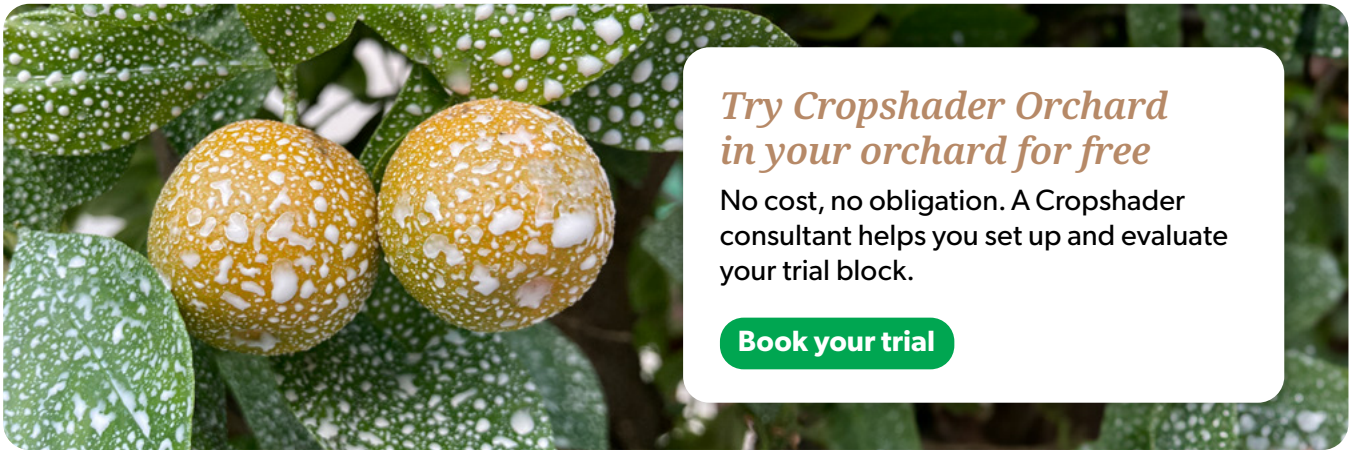
5. **MANDARINS, SATSUMA**
   Netherlands test garden
   Even in a milder climate, Cropshader Orchard still kept fruit about 3–4 °C cooler at the surface.[5]

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In every trial, Cropshader Orchard and non-coated trees had the same irrigation, fertiliser and pruning. The only difference was the coating.[2–3]

In the next chapters you will see:

- What does 3-6 °C cooler actually mean in relation to sunburn and stress?
- How Cropshader Orchard changed photosynthetic activity and why that matters for yield and tree resilience.[2]
- How the effect repeats in different crops, so you can judge what to expect for your own apples, pears, walnuts, olives and citrus orchards.[1–5]
- A simple ROI calculation you can use to calculate the potential impact of Cropshader Orchard on your own crops and output.



Try Cropshader Orchard in your orchard for free

No cost, no obligation. A Cropshader consultant helps you set up and evaluate your trial block.

Book your trial

"After more than 50 years of developing shading coatings for greenhouses, bringing that expertise to the orchard market is a major milestone," says Halil Özkan, Business Development Manager at Lumiforte. "Cropshader Orchard reflects years of formulation, field trials, and close collaboration with growers facing hotter, drier seasons," adds Martijn Koerts, Business Unit Manager. "It marks the first step in translating proven greenhouse shading knowhow into practical solutions for orchard crops adapting to today's climate."



Martijn Koerts
Business Unit Manager
Lumiforte



Halil Özkan
Business Development Manager
Lumiforte

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Why heat and sunburn are quietly eating into orchard profits

Most growers recognise the visible symptoms of sunburn: bleached or brown patches on fruit, rough peel, sometimes cracked skin.[6] The real damage often shows up later, when the cooperative or packhouse grades the fruit and a bigger share than you expected ends up as second class or juice.[6]

What you don't see is that heat stress starts much earlier. On very hot, dry days the tree closes its stomata to slow down water loss, a bit like turning down a tap to save moisture. That protects the tree from drying out, but it also means less "breathing" and growth, leaf and fruit temperatures keep climbing, and only later do the yellowing and visible sunburn spots appear. This is why having protection in place before a heatwave hits is so important.

Reviews of fruit production under high temperature stress report that sunburn can downgrade or discard 10–30% of the crop in hot seasons, depending on variety and region.[6–7] For any commercial orchard, that is a large slice of revenue disappearing before the fruit ever reaches the market.[6–7]





Over the coming years, this pressure is likely to get worse, not better. Climate studies for key fruit regions in Europe and the Mediterranean show more frequent and intense hot spells, with heatwaves that used to be rare now expected to occur several times per decade.[7,9–10]







> *Reviews of fruit production under high temperature stress report that sunburn can downgrade or discard 10–30% of the crop in hot seasons.*



In practical terms, that means more days above 35 °C in summer, more afternoons where fruit surface temperature pushes into the danger zone, and more seasons where "heat damage" becomes a recurring line in the packout report instead of a one-off event.[7,9–10]

Three trends make the problem harder to ignore each year:

- More and stronger heatwaves. A run of clear days above 35 °C can quickly push exposed fruit well above air temperature, especially on the western side of the canopy, increasing the risk of sunburn browning and longterm quality issues. [6,9]
- Less "easy" water. In many regions, irrigation is more expensive and sometimes restricted, so you cannot simply irrigate your way out of heat stress or run overtree sprinklers all afternoon without thinking about water and energy.[7,9–10]
- Stricter programs and markets. Buyers and retailers expect clean peel, good colour and consistent quality; too much sun damage, cracking or visible traces, creates issues at the dock and in the cold store, not just in the field.[7,11]

Trees under heat stress are also more vulnerable to diseases and insects, as their natural defenses weaken. Even without direct sunburn, this secondary pressure can still hurt fruit quality down the line. To manage this, growers already use a mix of tools: shade nets, kaolin or chalk-based products sprays, and sometimes overtree sprinklers or misters.
Each of these can work, but each comes with tradeoffs in investment, labour, efficiency or water use.[7,11] Shade nets protect well but are capital-intensive and fixed; kaolin based products are usually not efficient enough in terms of wear resistance and UVB reflection, alongside their non-biodegradable profile; water-based cooling depends on availability, permits and pumping costs.[7,10–11]

Cropshader Orchard is designed to fit into that toolbox as a temporary, sprayon reflective coating that:

- Helps knock degrees off fruit and leaf temperature during hot spells.[1–5]
- Uses a biobased, biodegradable formulation, with more than 93% of raw materials from natural origin and no added microplastics.[12]
- Can be applied with existing spray equipment or drones, without investing in permanent infrastructure.[12]

When you read the rest of this whitepaper, you will see how this looks in real orchards and test gardens, and how applying Cropshader Orchard around early fruit set directly helps cool trees, reduce sunburn risk and lower stress, while increasing the share of fruit that reaches first-class cartons. If applications are needed later in the season, fruit can still be sent to the packhouse, where washing with brushes generally removes any remaining visible traces.[1–5]

How these Cropshader Orchard trials were set up

Reliable numbers matter when you are deciding whether to test a new product. All trials in this report followed a simple but robust approach so that the results are worth your time.[1–5]

- Coated vs. non-coated trees in the same orchard. In each trial, a part of the orchard was sprayed with Cropshader Orchard at a 1:20 dilution in water, using standard sprayers or atomisers. The rest of the orchard stayed untreated as a control.[2–3]

- Same farming practice on both sides. Irrigation, fertilisation, pruning and crop load were kept identical. The only difference was whether the trees had Cropshader Orchard on their canopy or not.[2–4]

- Multiple trees and positions. Typically, four Cropshader Orchard trees and four non-coated trees were selected per trial. On each tree, measurements were taken on several sides of the canopy (north, east, south, west) and on several leaves and fruits per side, to reflect real variability in the orchard.[1–5]



- Objective measurements.
  - Surface temperature was measured with handheld infrared thermometers at a fixed distance.[1–5]
  - In walnuts, photosynthetic activity and electron transport rate (ETR) were measured with FluoMini Pro chlorophyll fluorescence sensors over four days, logging every five minutes.[2]

- Basic statistical tests (twosample ttests, following CENTS 177001 guidance) were used to compare averages between coated and non-coated trees, so the differences shown later in this report are backed by more than just visual impressions.[2–3]

Apple and pear trials in France: independent verification from Verger de Poisy

To complement the general results in this whitepaper, Cropshader Orchard was also evaluated independently by Verger de Poisy, an orchard trial station in France, during the hot 2025 season. Their objective was to compare Cropshader Orchard with a standard kaolin clay and an untreated control on commercial-type pears and apples under real field conditions, and to measure both protection and persistence in a year with multiple heatwaves[1]

Conference pears: reducing leaf burn (folletage)

On Conference pears, Verger de Poisy focused on "folletage" (leaf burn), which quietly reduces tree performance and next year's potential in hot summers. Two applications of Cropshader Orchard clearly limited the development of folletage symptoms during the August heatwave compared with both clay and the untreated control. While average folletage intensity on the control and clay plots climbed towards 3 on a 0–5 scale, Cropshader Orchard plots stayed in the 1.25–1.75 range, and far fewer trees moved into the higher damage classes.[1]

At harvest, pears treated with Cropshader Orchard showed only light traces of product, which the station judged compatible with normal commercialization on naturally russeted Conference fruit.[1] If required these traces can generally be removed on most commercial packing lines equipped with water-filled tanks and brushes.





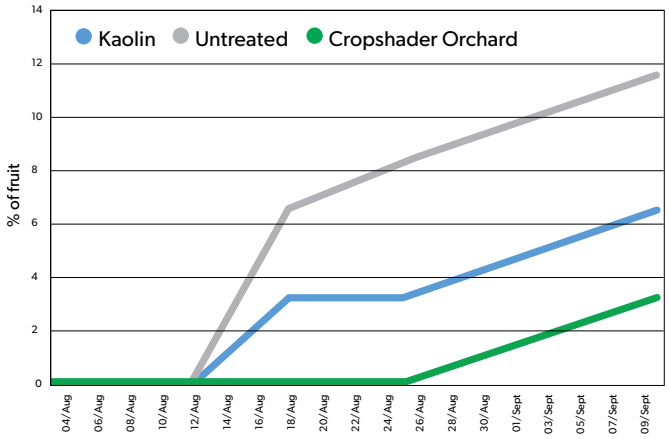

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Suntan and Elstar apples: reducing sunburn

On Suntan and Elstar apples, the French trial measured sunburn directly on the fruit. In Suntan, the untreated control reached around 12% sunburned fruit at harvest, while clay reduced this to roughly 6% and Cropshader Orchard brought it down to about 3%. That corresponds to around 70% efficacy versus the control for Cropshader Orchard, compared with about 40–45% for clay.[1]

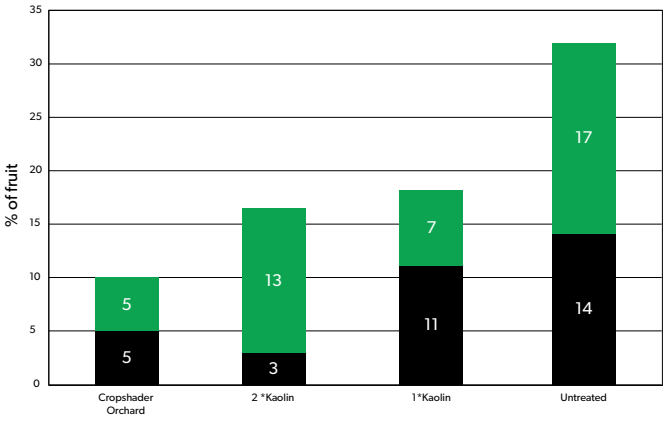
On Elstar, Cropshader Orchard again reduced the share of fruits with sunburn symptoms in the most exposed parts of the canopy. Efficacy against advanced sunburn was around 70% for Cropshader Orchard, versus roughly 40–50% for clay, even though no product could completely eliminate damage in such an extreme season.[1]

Suntan
Sunburn damage - during the summer season



Cropshader Orchard consistently showed the lowest level of sunscald damage compared to kaolin and untreated trees, slowing damage progression under high heat. Assessments were based on 60 fruits per treatment.

Elstar
Sunburn damage - Upper part of tree



Cropshader consistently reduced sunburn damage compared to untreated trees and mineral coatings

Film quality, persistence and practical use

The Verger de Poisy report also highlighted that Cropshader Orchard formed a whiter, more homogeneous film than clay and showed good persistence through heavy rain events close to harvest, so the canopy remained protected in the critical period before picking.[1] Any remaining coating should be managed in the packhouse with washing and brushing, in line with the approach described for other orchards in this whitepaper.

Taken together, these independent French results show the same pattern as the other orchards in this report: when Cropshader Orchard is on the canopy, fruit and leaves run cooler and suffer less sunburn. In the next sections, you will see how this effect repeats in internal trials on walnuts, apples, olives and mandarins, so you can judge what to expect in your own orchards.

Walnut orchard in Turkey: keeping nuts safe in a brutal August

By mid-August, a Chandler walnut orchard near Isparta showed a familiar pattern for many growers: a stretch of hot, dry days during nut fill, followed by more quality issues at the cracking stage than expected. The trees were nine years old, planted at 7 × 4 m spacing, with approximately 2 hectares in production.[2]

In past seasons, careful irrigation and nutrition still could not prevent hull burn and uneven kernel fill in the hottest weeks. Nets on every hectare were not realistic, and building extra cooling infrastructure would have meant a big, long-term investment. Like many export-focused growers, the owner was looking for something he could add to his existing program when the forecast turned extreme, without changing the whole orchard system.

That season, one section, about 1.000 m^2, was sprayed with a 1:20 Cropshader Orchard dilution using the regular orchard sprayer. The rest of the block stayed as it was: same irrigation, same fertiliser, same pruning and crop load. The only difference was the reflective coating on the leaves and nuts.[2]

A few days later, when the temperatures climbed towards 37–40 °C, surface temperatures on both coated and non-coated trees were measured with handheld infrared thermometers, and photosynthesis sensors were installed on selected leaves.[2] The visual impression matched what many growers notice when they walk into a coated section: the canopy feels noticeably cooler.





> *Cropshader Orchard trees were about 5.2 °C cooler at the surface than nuts on the untreated tree.*

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The measurements put numbers to that effect:

- *On average, nuts on Cropshader Orchard trees were about 5.2 °C cooler at the surface than nuts on the untreated trees standing just a few rows away.*[2]
- *Leaves showed a similar difference, with Cropshader Orchard trees running about 4.9 °C cooler than the control.*[2]

In the same period, chlorophyll fluorescence sensors recorded how actively the leaves were photosynthesising. Across four days of measurements, Cropshader Orchard trees showed roughly 15% higher daytime photosynthetic activity than non-coated trees under the same light and temperature, and better recovery during the night.[2]

Put simply, in the coated part of the orchard, the tree canopy was cooler and working harder at the same time.

What this means for walnut growers and their consultants

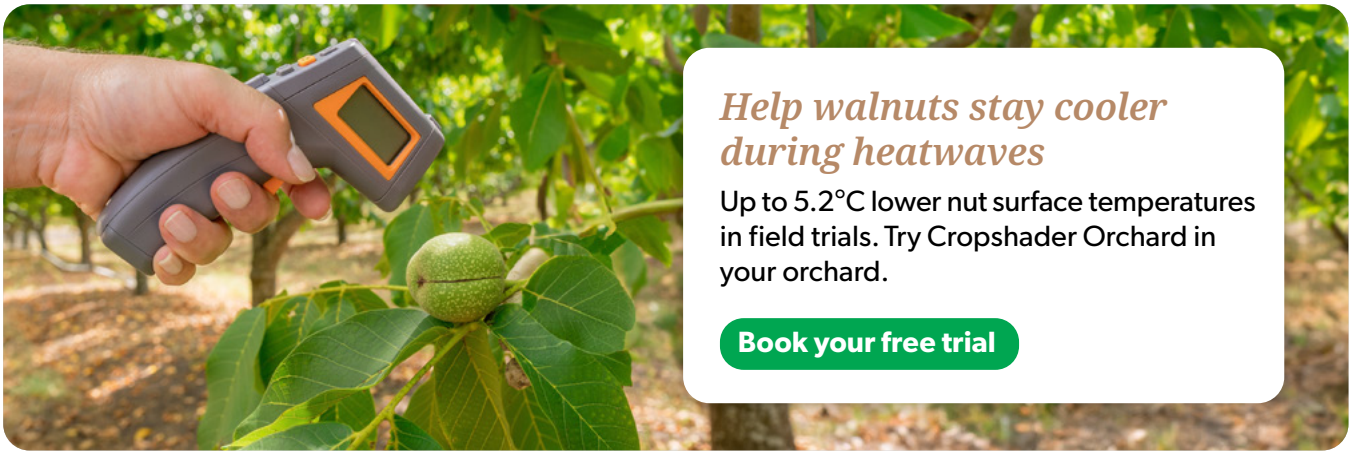
If you grow walnuts in a hot inland climate, your main concerns during August are straightforward:

- Will the next heatwave push nuts into sunburn and hull damage?
- Will the trees still have enough "engine power" to fill the kernels properly after several hot spells?

The Isparta trial suggests that Cropshader Orchard can help on both points:

- By taking roughly 5 °C off nut and leaf temperature on hot days, it keeps more of the canopy out of the temperatures where sunburn and tissue damage start to appear.[2]
- By supporting higher daytime photosynthetic activity, about 15% in this orchard, it helps trees continue filling nuts instead of spending all their energy just coping with stress.[2]

For growers who cannot justify nets or evaporative cooling on every hectare, as well as the fact that sprinklers or cooling are not common in Mediterranean countries, which suffers high temperatures and irrigation water supply issues. Cropshader Orchard offers a flexible way to protect the most exposed blocks or rows when the forecast looks harsh. Many walnut growers start with one or two trial blocks on their sunniest slopes, compare nut quality and tree condition at harvest, and only then decide how far to scale up in the following season.



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Apple orchard in Turkey: helping Granny Smith through hot, clear days

In another orchard near Isparta, a block of Granny Smith apples was facing a similar challenge. The trees were seven years old, bright green and vigorous, but the grower was noticing more sun exposed fruit arriving at the packhouse with pale, rough patches or deeper brown burn on the shoulders.[3] On clear days around 35 °C, the western side of the rows was especially vulnerable exactly where export programs are least forgiving.[7]

Nets were installed on some highvalue blocks, but not everywhere. As in many apple regions, water was also not unlimited, which made largescale evaporative cooling difficult. The question was simple: could a reflective coating like Cropshader Orchard give those exposed Granny rows a safety margin on hot days, without changing the orchard layout or buying new equipment?

A trial was set up in a 1.000 m^2 area of the orchard. Half of this strip (500 m^2) was sprayed with Cropshader Orchard at a 1:20 dilution using the existing sprayer; the other half remained untreated as a sidebyside comparison.[3] Irrigation, nutrition and crop load stayed identical.

Mid August – a time when fruit surface temperatures normally climb quickly – measurements were taken on four Cropshader Orchard trees and four non-coated trees. On each tree, leaves and fruits were measured on all four sides of the canopy with a handheld infrared thermometer.[3] Air temperature was about 35 °C with relative humidity around 25%.[3]









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The pattern was clear:

- *Average leaf temperature on Cropshader Orchard trees was 28.4 °C, compared with 33.1 °C on non-coated trees; roughly 4.7 °C cooler.*[3]
- *Average fruit temperature on Cropshader Orchard trees was 29.0 °C, compared with 33.9 °C on untreated trees; about 4.9 °C cooler.*[3]

Across 128 individual measurements, Cropshader Orchard trees consistently showed lower surface temperatures than the control trees in the same block.[3] Statistical checks confirmed that this difference did not come from a few lucky readings but from a real, repeatable effect in the coated part of the orchard.[3]

What this means for apple growers and their consultants

Green and yellow apples like Granny Smith are well known for their sensitivity to sunburn and "photooxidative" damage. Extension services describe how, when fruit surface temperature climbs beyond certain thresholds for several hours, damage can move quickly from light discoloration to deep browning and even cracking.[8]

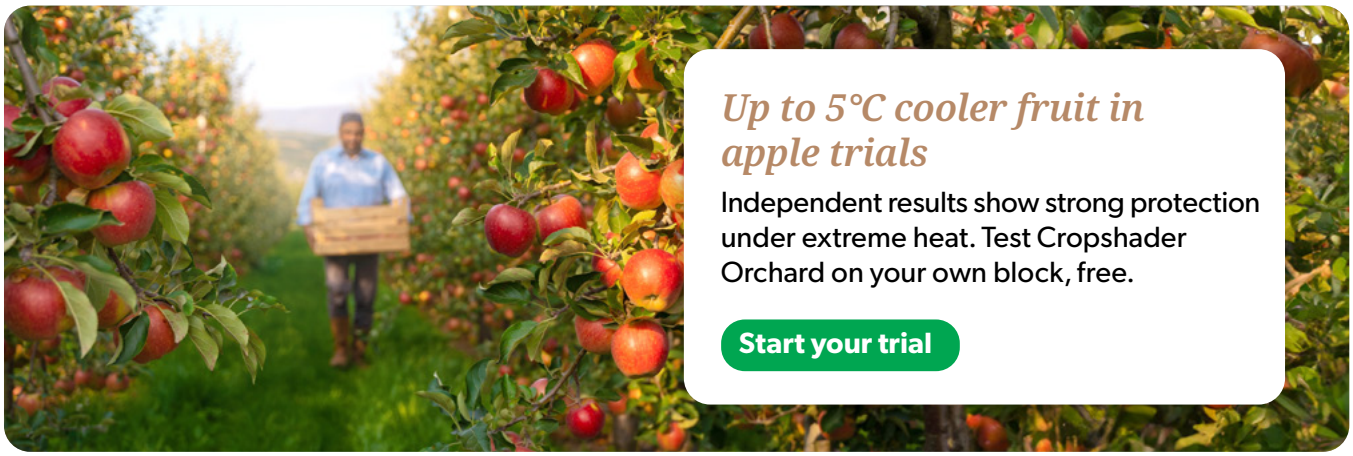
For growers supplying demanding export programs, this often means:

- More Class II fruit than planned.
- Tight picking windows to avoid overexposed rows.
- Extra pressure on pruning, irrigation and even row orientation decisions.[11]

This trial shows that Cropshader Orchard can provide an added buffer for exposed rows:

- On a 35 °C day, treated fruit averaged about 5 °C cooler than untreated trees.[3]
- This helps keep fruit below critical surface temperatures where severe sunburn risk rises sharply, particularly on the western canopy side.[7]

For a head grower, this does not replace good canopy management or irrigation. But it adds another lever: when the forecast shows, hot days near a sensitive stage (for example, just before colour break on bicolour varieties or later for Granny), a Cropshader Orchard application can help protect a larger share of the crop without changing the structure of the orchard. Washing of fruits will be needed if applied closer to harvest, white traces on crops can generally be removed on most commercial packing lines equipped with water-filled tanks and brushes.



Up to 5°C cooler fruit in apple trials

Independent results show strong protection under extreme heat. Test Cropshader Orchard on your own block, free.

Start your trial

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Olive orchard in Spain: taking the edge off Andalusian sun

In Humilladero, Andalusia, a 10-year-old Hojiblanca orchard was dealing with the kind of late-season heat many Spanish growers now face. The trees were wellmanaged, with a 6 × 4 m planting distance and around 5 hectares in production.[4] Yet, in warm years, the grower saw more fruit with heat-related damage and worried about how high midday temperatures might affect both oil quality and tableolive appearance.[7]

The farm already had efficient irrigation and a solid pruning strategy. Nets or overtree cooling on a large scale were not realistic options. The question on the table was: can a reflective coating help keep fruit and leaves cooler in this kind of Mediterranean sun, without changing the whole system?

To find out, a 1.000 m^2 area was sprayed with Cropshader Orchard at a 1:20 dilution using the existing atomiser, while the rest of the orchard remained untreated as a control.[4] Management was kept identical on both sides.

On 5 October at midday (around 12:00), when the sun was high and air temperature was about 31 °C with relative humidity close to 59%, surface temperatures were measured on four Cropshader Orchard trees and four non-coated trees. On each tree, fruits and leaves were measured on all canopy sides with a handheld infrared thermometer.[4]





> *Cropshader Orchard keeps fruit and leaves around 4-5 °C cooler at midday.*

The results were consistent:

- *Average leaf temperature on Cropshader Orchard trees was 25.7 °C, compared with 29.8 °C on non-coated trees – roughly 4.1 °C cooler.*[4]
- *Average fruit temperature on Cropshader Orchard trees was 25.5 °C, compared with 30.3 °C on untreated trees – about 4.8 °C cooler.*[4]

Across 128 measurements, the coated trees repeatedly showed lower surface temperatures than the control trees, and the basic statistical comparison confirmed that this gap was real and consistent.[4]

What this means for olive growers and their consultants

For Hojiblanca and many other olive varieties, heat and sunlight do more than burn the skin. High fruit temperatures can speed up oxidation processes and negatively influence flavour, colour and shelflife – whether the olives go to the mill or the table.[7]

In practice, that means:

- More fruit that underperforms in oil analysis compared with its potential.
- Extra sorting in the grading line to remove heatdamaged olives.
- More pressure on irrigation and harvest timing in late summer and early autumn.

The Andalusian trial suggests that Cropshader Orchard can ease those decisions:

- By keeping fruit and leaves around 4–5 °C cooler at midday, Cropshader Orchard reduces the time that olives spend at the highest surface temperatures.[4]
- This helps protect both appearance (for table olives) and internal quality for oil production, especially in exposed parts of the orchard.[7]

Because Cropshader Orchard is sprayed with the same equipment used for other orchard treatments, it can be targeted to the most vulnerable blocks, slopes or varieties without requiring new structures or water systems.[4] Many olive growers start by coating:

- The blocks that historically show the most heat damage or irregular ripening.
- The most sunexposed sides of the orchard (for example, western slopes).

They then compare fruit quality, oil parameters and sorting losses between coated and non-coated areas at harvest to decide on the right strategy for the following year.



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Citrus / mandarin test: proof that cooling works even in milder climates

Most growers associate Cropshader Orchard with hot, dry regions. To understand how it behaves in a milder but still sunny climate, Lumiforte, the parent company of Cropshader Orchard, also tested the coating on Satsuma mandarin trees in its own trial garden in Baarle-Nassau, in the south of the Netherlands.[5]

The Satsuma variety was chosen because it is a classic easy-peel mandarin with thin skin and high market expectations for colour and appearance. Trees in the test garden were four years old, planted at 3 × 4 m spacing.[5]

Four trees were treated with Cropshader Orchard at a 1:20 dilution using a simple airpressure sprayer, and four similar trees were left untreated. Harvest, irrigation and nutrition were identical for both groups.[5]

On 18 September at 14:00, a sunny afternoon with air temperature around 26.3 °C and relative humidity about 61%, surface temperature measurements were taken on all eight trees. Using the same protocol as in the other trials, two fruits and two leaves per canopy side were measured with a handheld infrared thermometer.[5]





> *Cropshader Orchard reduces fruit surface temperature by 3–4 °C, even in a moderate Norther European climate.*

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Even though the climate was milder than in Turkey or Spain, the effect was still clear:

- *Average leaf temperature on Cropshader Orchard trees was 21.2 °C, compared with 24.4 °C on non-coated trees: 3.2 °C cooler.*[5]
- *Average fruit temperature on Cropshader Orchard trees was 20.6 °C, compared with 24.1 °C on untreated trees: 3.6 °C cooler.*[5]

The difference may be slightly smaller than in the hotter orchards, but it shows the same pattern: wherever Cropshader Orchard is applied, fruit and leaves run cooler than in the untreated trees nearby.[5]

What this means for citrus growers and their consultants

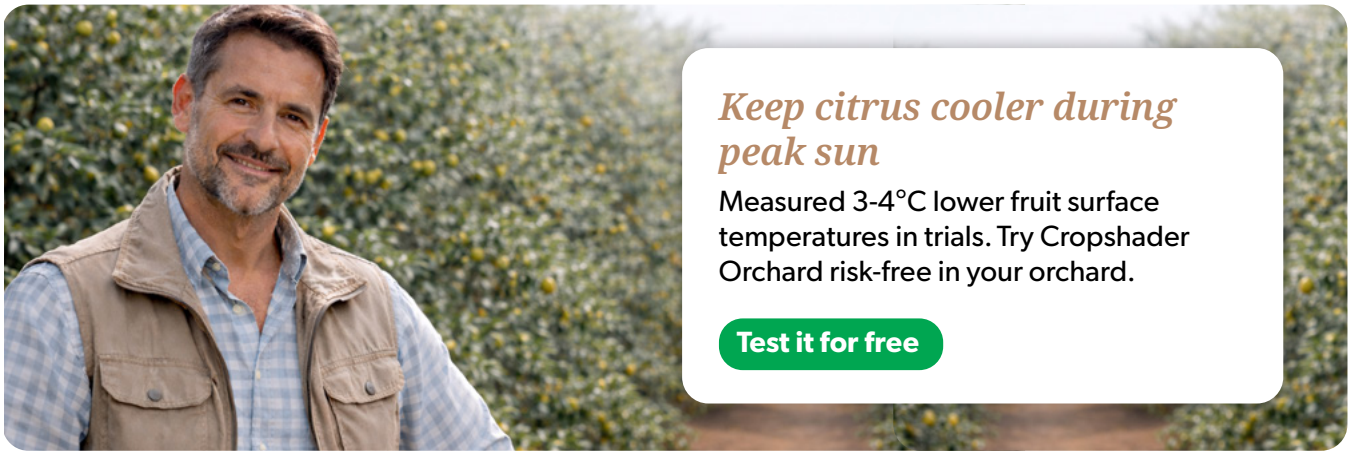
For citrus and mandarins in Mediterranean or semitropical climates, Satsuma behaviour in the Netherlands is a useful indicator:

- If Cropshader Orchard can reduce fruit surface temperature by 3-4 °C in a moderate Northern European trial, it is reasonable to expect similar or stronger cooling under higher air temperatures and stronger radiation, as seen in the apple, pear, walnut, olive and citrus results.[1–5]
- That cooling buffer can support better peel quality and colour development, especially on sensitive varieties and exposed rows.[7]

In real citrus orchards, Cropshader Orchard is most often used to:

- Protect blocks that consistently show peel burn on the western side.
- Support young or newly grafted trees that do not yet have a fully closed canopy.
- Add a flexible, spraybased layer of protection in orchards where full netting is not an option on every hectare.[5,11]

By combining these mandarin results with the hotterclimate trials, citrus growers can build a realistic picture of what Cropshader Orchard can deliver: several degrees less fruit and leaf temperature when it matters most, without heavy infrastructure or complicated new routines.



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What Cropshader Orchard could mean for yield and value

Every orchard is different, but most growers look at the same three numbers when deciding about a new tool:

1. **How many fewer fruits end up sunburned or downgraded?**
2. **How many extra Class I kilos per hectare does that create in a hot season?**
3. **Does that extra revenue comfortably cover the product and application cost?**

This whitepaper is not a calculator, but it can give you a framework for running the numbers with your own data.

Turning cooler fruit into extra Class I kilos

The trials show that Cropshader Orchard can keep fruit surface temperatures several degrees lower during hot periods.[2–5] Combined with independent studies that link those temperatures to sunburn levels,[7] a reasonable expectation in hot years is:

- A noticeable reduction in severe sunburn on the most exposed side of the canopy.
- Fewer fruits being downgraded due to cosmetic damage into unsaleable fruit.





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For example, if your packhouse reports that in a difficult year 15% of your apples or mandarins are downgraded mainly because of sunburn, and Cropshader Orchard helps you cut that to 8–10% on treated blocks, you have just regained 5–7% of your crop into highervalue classes. The same logic applies to kernel quality in walnuts or tableolive appearance.

A simple ROI calculation

You can sketch a first return-on-investment view with four inputs:

A) Hectares treated with Cropshader Orchard (ha).
B) Average yield per hectare (kg/ha).
C) Average extra Class I % you expect on treated blocks in a hot year (for example, 5%).
D) Net value per extra Class I kilo compared with downgrade (€/kg).

Extra revenue in a hot year ≈ A × B × C × D.

Compare that number with your total Cropshader Orchard cost per hectare, including product and spraying (sometimes combined with another pass; prices vary, so please contact us directly for an indication).

The detailed apple, pear, walnut, olive and citrus trials in this report give you realistic cooling numbers to plug into your own thinking.[1–5] Your actual outcome will depend on variety, canopy, irrigation and how severe your heat events are – which is why a small, welldesigned trial block on your own farm is the most convincing way to finish the ROI story.





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Conclusion: Cropshader Orchard fits in your heat protection toolbox

Across apples, pears, walnuts, olives and citrus, Cropshader Orchard showed the same effect: coated canopies ran several degrees cooler than untreated trees, and in walnuts leaves used light more efficiently under stress.[1–5]

For growers, that cooling and stress reduction translates into:

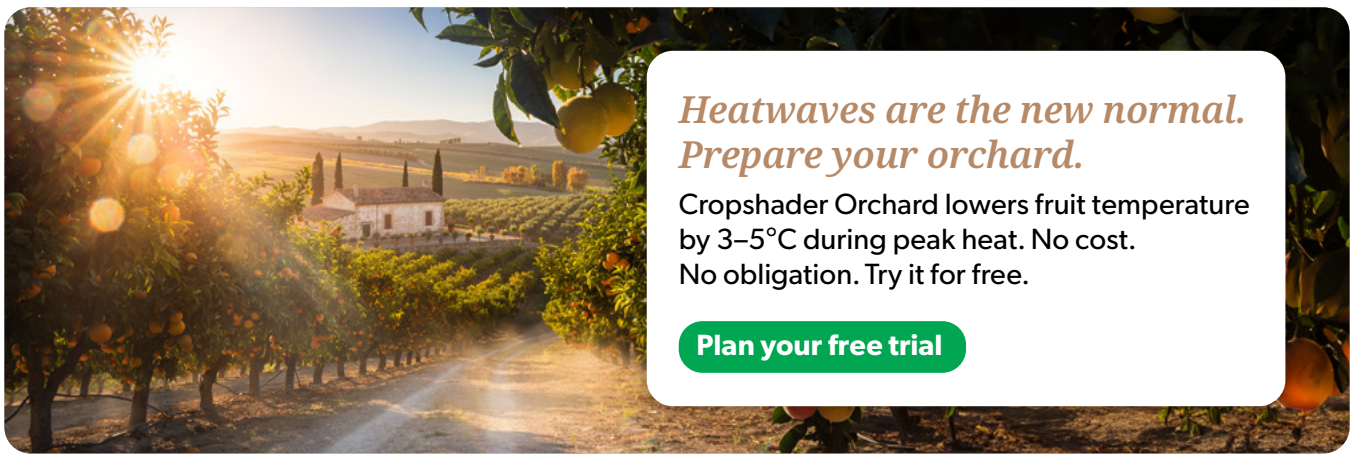
- Less time with fruit in the dangerous temperature range where sunburn accelerates.[7]
- Better support for photosynthesis and tree resilience during prolonged heat.[2,5]
- A flexible solution that can be applied where and when needed, using existing spray equipment, without the cost or complexity of permanent structures.[12]

Cropshader Orchard is not designed to replace nets, irrigation or canopy management. It strengthens heat defence, particularly where other options are too costly or impractical.

If your orchard reflects the situations described in this report, the next steps are clear:

- Use the ROI calculator to estimate what a realistic reduction in sunburn could mean in additional Class I kilos and euros per hectare under your conditions.
- Establish a small Cropshader Orchard trial block this season using the plan outlined earlier.
- Share the results with your consultant, cooperative or buyer so that next year's heat protection decisions are based on both this data and your own experience.

Heatwaves are no longer exceptional; they are part of the new normal. The question is not whether they will impact your orchard, but how prepared you are when they do. Cropshader Orchard offers a practical, bio-based way to reduce heat damage and secure more of your harvest through the most challenging weeks of the season.



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About Cropshader Orchard



Cropshader Orchard is a starch-based, liquid reflective coating developed by Lumiforte to help orchard growers protect fruit and leaves against heat stress and sunburn while keeping trees productive. It was designed as an alternative to less effective koalin based products and expensive infrastructure, so growers can respond quickly when heatwaves are on the way.[11]

When sprayed at the recommended dilution, the coating dries into a thin layer of fine white droplets on leaves and fruit. This layer reflects part of the incoming solar radiation, heat, and UVB light, which helps lower surface temperature without blocking stomata or "suffocating" the leaf. Field trials in apples, pears, walnuts, olives and citrus have shown consistent cooling of around 3-5 °C at the fruit and leaf surface, combined with improved photosynthetic performance under stress in walnuts.[1–5]

Cropshader Orchard is registered in the European Union as a biostimulant for woody perennials, in line with the CENTS 177001 guideline for demonstrating tolerance to abiotic stress. It is formulated with a high share of raw materials from natural origin 93% and is readily biodegradable, supporting cooperatives and growers who are under increasing regulatory and sustainability pressure.

In practical terms, Cropshader Orchard:

- Can be applied with existing orchard equipment or drones, using a 1:20 dilution in clean water and standard nozzles.
- Fits into current spray programs, typically starting around fruit set with repeat applications as needed in long, hot summers.
- Is designed so that, when applied according to the label, any remaining coating can be removed on normal packingline equipped with washing and brushing systems if required by the market.

For Lumiforte, the Cropshader Orchard brand is the next step after decades of experience with greenhouse shading coatings: taking proven reflective technology from glasshouses and adapting it to the reality of openfield orchards. The aim is simple give growers a practical, biobased tool to keep orchards productive in a warming climate, without making their work more complicated.

References

1) Verger de Poisy. CR Lumiforte 2025 – folletage poire et échaudure solaire pomme (Cropshader Orchard). Poisy (FR): Verger de Poisy; 2025.
Available from: https://www.vergerdepoisy.fr/wp-content/uploads/2025/11/CR-lumiforte-2025-avec-compression.pdf

2) Lumiforte. Walnut field trial – average temperature benchmark (Chandler, Isparta, Turkey). Internal trial report for Cropshader Orchard (LDC301)

3) Lumiforte. Apple field trial – average temperature benchmark (Granny Smith, Isparta, Turkey). Internal trial report for Cropshader Orchard (LDC301)

4) Lumiforte. Olive field trial – average temperature benchmark (Hojiblanca, Humilladero, Spain). Internal trial report for Cropshader Orchard (LDC301)

5) Lumiforte. Mandarin field trial – average temperature benchmark (Satsuma, Baarle-Nassau, Netherlands). Internal trial report for Cropshader Orchard (LDC301)

6) Fischer G, et al. Sunburn disorder in tropical and subtropical fruits: a review. 2022.

7) European Parliament. The impact of extreme climate events on agricultural production. 2023.

8) Lal N, Sahu N. Management strategies of sun burn in fruit crops: a review. Int J Curr Microbiol Appl Sci. 2017;6(6).
Available from: https://www.ijcmas.com/6-6-2017/Narayan%20Lal%20and%20Nisha%20Sahu.pdf

9) Pechan PM. Reducing vulnerability of fruit orchards to climate change. Agric Syst. 2023.

10) CLIMED FRUIT, EU CAP Network. Climate change resilience for perennial Mediterranean crops.

11) Washington State University Tree Fruit Research & Extension Center. Sunburn in apple and strategies to mitigate it.
Available from: https://treefruit.wsu.edu/sunburn-in-apple-and-strategies-to-mitigate-it/

12) Lumiforte, Sendot Research. Walnut field trial – photosynthetic activity benchmark (Chandler, Isparta, Turkey). Internal trial report for Cropshader Orchard (LDC301).

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lumiforte® smart coating solutions

Cropshader is part of the Lumiforte® portfolio, a company known for developing innovative, sustainable, and science-driven solutions for agriculture and horticulture. As a Lumiforte brand, Cropshader benefits from decades of expertise, global reach, and a strong commitment to supporting growers with products that improve resilience, yield, and sustainability.

www.cropshader.com