

Considerations When Choosing the Design and Type of Protected Cropping Structures

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This article provides an overview of factors to consider on the use and design of protected cropping berry structures and making sure that these structures are right for you, your budget, climate and crop

Australia's berry growers are facing ever-increasing challenges from unpredictable weather; hailstorms, heavy rain, strong winds, heatwaves and frost can all wreak havoc on delicate fruit. Protected cropping structures offer a smart and proven solution, shielding crops from environmental stress while improving fruit quality, consistency, and yield.

To get the most value from these systems, it is essential to select a structure that aligns with your crop type, climate, production goals, and budget.

Why Use Protected Cropping?

Protected cropping structures provide benefits that extend well beyond basic weather protection

- **Weather resilience:** Shields crops from hail, wind, frost and excessive rainfall
- **Pest and wildlife control:** Reduces damage from birds, bats, and certain insects
- **UV Protection:** Reduces sunburn on fruit
- **Microclimate creation:** Reduces evaporation, improves temperature control, and lowers water use
- **Improved fruit quality:** Less bruising, cracking, and marking by reducing or eliminating damage from hail, rain, and wind
- **Yield consistency:** Increases control of growing climate, therefore increasing control of environmental factors like watering and fertigation
- **Reduced fruit Splitting:** Shelters the crop from heavy rainfall

By creating a more stable and sustainable growing environment, protected cropping can potentially enable earlier harvests, extend picking windows, improve pack-out rates - all of which help growers meet market demand and maximise returns.

Custom vs. Off-the-Shelf Structures

Not all structures suit all situations. A design that performs well in Far North Queensland will rarely perform optimally in Tasmania's cooler, lower-humidity climate. That's why custom-designed structures are often the smarter choice. They can be tailored to your crop type, variety, and local conditions, without unnecessary features that can drive up costs.

For example, structural height affects temperature. The higher we go in height and the further north we go, the stronger we must build the structure to cope with not only the wind loading on a taller structure but also the increased wind ratings required further north. This all adds cost, which a grower further south can avoid.

While custom solutions can appear more expensive initially, they often deliver greater long-term value than an off-the-shelf product that is not designed to match your particular crop and climate. A carefully considered custom structure can create an environment allowing higher yields, improved fruit quality, reduced losses, and the ability to hit the market when prices are highest.



A semi flat roof climate/rain cover structure for better airflow and heat dissipation with a bungee connection method designed to reduce any structural load by releasing any hail safely into the interrow



3 in 1 system incorporating clipped hail release style netting for hail and bird protection, trellising and climate/ rain covers shown here in the stored position with the protective black covers fitted

All photos credit: Agrinova

Shade Factors and Covering Material Selection

Colour and transparency are not just for aesthetics. It also has a major influence on the following factors

Shade factors

It's not just the aperture (the size of the open space between the threads) and the type of weave that affects the shade factor, the colour of the net has a role in this as well. Different netting suppliers will have different specs for their colours. Black net will tend to have a 30-50% higher shade factor than white net. White net has transparent ingredients in the filaments as part of its manufacturing process. There is an ever-increasing range of different Tunnel/Greenhouse Films and netting fabrics available on the market, so it pays to check different manufacturers and match the shade requirements for your particular crop, variety and region. Shade will have a major influence over your crop yield and timing, and excess shade can slow the fruit ripening.

Diffusion

This can also have an influence on your crop's yield and timing, so diffusion is another factor that will need to be taken into consideration when it comes to material selection. As noted above, both white and translucent netting incorporate transparent filament materials, resulting in greater light diffusion compared to black netting, helping light penetrate more evenly throughout the canopy. Also, with netting, the higher the grams per square metre (Gsm), the greater the diffusion. If you are after Diffused Light, it pays to carefully check the netting's full specifications.

Material Lifespan and Durability

1. Tensile Strength

It's not just the thickness (μm or Gsm) of a film or netting that represents its strength. Factors such as tensile strength also come into play here. For example, we have seen 180 μm film specifications vary from a tensile strength of 22-28 MPa (megapascal) depending on formulation and manufacturing quality. The higher the strength, the better, as it helps prevent film tearing and resist hail damage to the film.

2. UV Stabilisation

As outlined above, UV stabilisation plays a key role in the ongoing strength and longevity of covering

materials. A clear example is the difference between black and white netting. Black netting typically lasts longer, as it contains natural elements such as carbon within its formulation, which act as an additional UV stabiliser. In contrast, white and translucent materials rely more heavily on added UV inhibitors, and in some cases, these inhibitors may already be included at their maximum effective percentage.

Initial and Ongoing Cost Factors

It's important to choose a high-quality, reputable brand and purchase the right structures and materials, as the labour costs to replace inferior materials will far outweigh the additional cost of using good-quality materials in the first place. A good quality net over a netting structure should last for a minimum of 10 years.

It is also important for us to consider a couple of other cost factors before we commit. Firstly, what our future costs on this structure will be, such as any of the materials, their lifespan, replacement costs and the amount of labour required to replace these components. Secondly, how do I properly maintain these structures to keep these costs down without devaluing my investment? It is highly recommended to have this conversation with any supplier before committing to a new structure, as it is like any good car - if you look after it and keep it serviced, it will look after you.

Design Features That Add Value

Modern protected cropping systems can integrate multiple functions - such as netting, rain/climate covers, and trellising - into a single structure. This reduces labour and material cost savings and helps make the installation quicker and less complex, and therefore more cost-effective.

To give us more control over temperature, humidity, pest protection, pollination, shading and weather protection within the structure, custom structures can have the following additional features added, such as:

- Openable roofing
- Openable side walls in either net or film materials
- Removable or openable additional shading
- Be built at a height and style that will influence the temperature within the structure

These additional features can allow earlier or extended harvests, potentially capitalising on premium pricing, better yields, and reduced losses across the season.

Other factors to consider before a purchase

Pollination

Consider how you will handle your pollination needs before you start setting up your structure. For example, for a blueberry structure that is netted, are we going to install hives inside the structure (some Beekeepers tend to frown upon this method) or are we going to leave the hives outside the structure?

For the latter, it is imperative that we have some way that the bees and other pollinating insects can access the crop. This can be done in several ways, such as larger-aperture netting on the side walls (Beekeepers recommend 20mm or greater), roll-up netting that we leave open at certain times of the year, bee-access windows with markers to guide bees into the structure, etc.

Climate

Not every season is the same, so to have a structure with the ability to open and close roof films when it's too hot, and netting to be deployed or retracted as conditions change, will also result in a yield and fruit quality increase and give you more flexibility in the climates you can operate in.

Structural Strength

It is also imperative to choose a structure that can stand up to the weather conditions in your area, as you never know when that next storm is going to hit. Any good, protected cropping structure supplier and builder should be able to provide wind ratings and warranty information. They should also be able to provide advice on the optimal placement of structures.

Cost-Saving Design Tips

To maximise return on investment, consider these design efficiencies:

Simple shapes:

Square or rectangular layouts are more cost-effective

Uniform row spacing:

Reduces material waste and simplifies construction

Greenfield sites:

Easier to build on open land without existing crops

Scale matters:

Larger structures often reduce per-unit costs

With thoughtful planning and tailored design, protected cropping structures can transform berry operations.

They provide protection where it matters most, enhance fruit quality, and support more consistent and profitable production, season after season.



Did you know that the Berry Industry Resource Library contains over 20 resources dedicated to Protected Cropping, including videos, previous journal articles and links to broader industry resources.

Visit bit.ly/BA-RL and search 'Protected Cropping'