Epicuticular waxes protect the berry against light and heat stress. Although their main function is as transport barriers, they also play a role in protection against PAR and UV radiation by scattering, reflection, and even absorption, thus reducing exposure levels in the underlying tissues (**Figure 8**). The capacity of this layer to scatter light is dependent on the size, distribution, and orientation of the wax crystals. Plate-like wax crystals reflect and scatter a higher proportion of light than amorphous waxes (Jenks and Ashworth, 1999), while still allowing for transpiration (Muganu et al., 2011). Plate-like wax structures prevail in light- exposed grape berries of several varieties, while berries grown in the shade of the canopy have a higher proportion of amorphous waxes (Muganu et al., 2011). As sunburn symptoms appear, these waxes lose their crystalline structure and become relatively amorphous (**Figure 8**; Greer et al., 2006).

Sun-exposed berries have a thicker layer of epicuticular wax and overall thicker cell walls than shaded ones (Rosenquist and Morrison, 1989; Muganu et al., 2011; Verdenal et al., 2019), which relates to a higher capacity to reflect light (20–80% of incoming radiation when compared to shaded plants that only reflect 10%; Jenks and Ashworth, 1999)

It was recently demonstrated that grapes from drought-stressed vines also accumulate higher amounts of epicuticular wax than grapes from non-stressed vines (Dimopoulos et al., 2020), potentially increasing resistance to high-light conditions.



“Epicuticular wax, often referred to as “bloom,” covers the surface of the cuticle as overlapping platelets forming a strongly hydrophobic layer that protects the berry from water loss and forms the first barrier against pathogen invasion (Grncarevic and Radler, 1971; Possingham et al., 1967; Rosenquist and Morrison, 1988)”