

## Plant-based Hue Alternatives to Cochineal and Carmine

Cochineal extract and carmine, sourced from insects primarily grown on South American cactus, have a long history (centuries) of safe consumer usage as colouring in food and beverages. These natural colorings demonstrate excellent heat and light stability. In recent years, product developers have often selected cochineal extract or carmine when replacing synthetic (artificial) colours in formulations.

Despite the safety, some consumers and companies request alternatives (Table 1) for the following reasons:

- Cochineal is an insect
- Cochineal is neither kosher nor vegan
- Cochineal, though not one of the eight common allergens, is potentially a food allergen.

Table 1. Hue Alternatives to Cochineal<sup>1</sup> and Carmine<sup>2</sup>

Hue Alternatives	Product	Application	Hue Alternatives	Suggested usage rates (%)
Purple Red	Cochineal WS 20 AP (481000)	Acidic beverages or confectionery	Purple sweet potato WS 42 (466000)	0.01 to 0.05
Orange	Cochineal WS 80 AP (481001)	Acidic beverages	Paprika WS 08 (443123)	0.01 to 0.05
		Confectionery	Paprika P 25 (443104)	
Red Pink	Carmine WS 45 (481002)	Confectionery, dairy, frosting	Select Carotenoid and Caramel Colour	0.025 to 0.05

<sup>1</sup> Carminic acid is the water-soluble extract of cochineal.

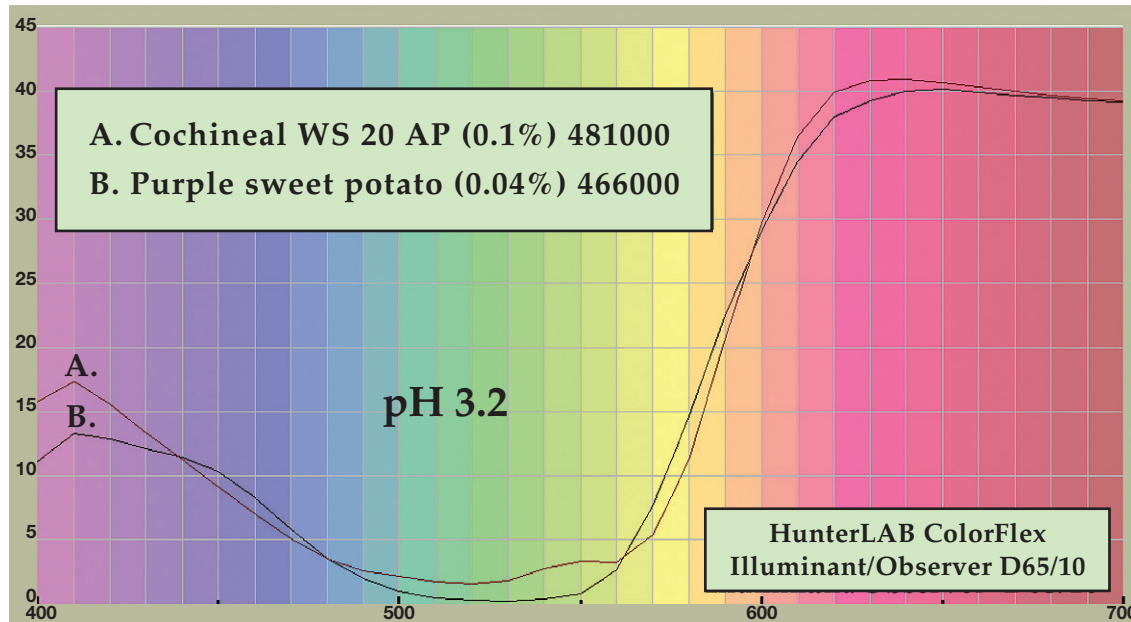
<sup>2</sup> Carminic acid complexed with calcium or other metals produces carmine.



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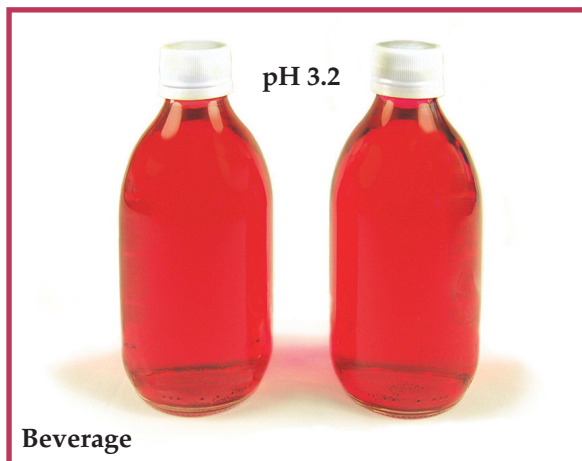
It remains very challenging to match the excellent heat and light stability of cochineal-based colouring with other naturally derived colouring. Hues are easier substitution targets. For example, the hue of water soluble cochineal is similar to anthocyanins from purple sweet potato (Fig. 1). Anthocyanins from black (purple) carrot may also apply, but the hue is more orange red than purple sweet potato colouring.

**Figure 1.**



In acidic beverages, purple sweet potato is close in hue to cochineal. Since purple sweet potato is derived from anthocyanins, its hue will become more purple as pH increases.

## Substituting for Cochineal and Carmine in Applications



Left: 0.1% Cochineal in solution  
 Right: 0.04% Purple sweet potato (466000) in solution



Left: Retail yoghurt containing carmine  
 Right: Yoghurt using DDW alternative colour



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