



Peeling back Apeel

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There's a new kid on the block that's garnered a huge amount of attention recently after a datasheet (https://www.evansvanodine.co.uk/assets/eng_apeel.pdf), allegedly detailing the toxic nature of its new product to extend the lifespan of fruit and vegetables, went viral. The datasheet, which is for a chemical cleaner, led us to look further into what Edipeel is and what it means for consumers.

Apeel Sciences (<https://www.apeel.com/>), is a US based company that's partnered with the Gates Foundation (<https://www.gatesfoundation.org/about/committed-grants/2015/08/opp1130141>) to develop a new product, Edipeel (<https://www.apeel.com/how-apeel-works>), an edible coating for fruit and vegetables, to solve the supposed food wastage 'crisis'. According to a 2019 report (<https://www.fao.org/3/ca6030en/ca6030en.pdf>) from the Food and Agriculture Organization, approximately 14% of all fruit and veg produced for human consumption is lost or wasted between the field and supermarket.

But is it really all down to the shelf life? One of the biggest issues when it comes to food waste is the supermarkets exacting standards seeing masses of vegetables and fruits left to rot before they even leave the fields because it's not pretty enough or straight enough!



Given the massive sums of money (<https://techcrunch.com/2021/08/18/apeel-bites-into-another-250m-funding-round-at-a-2b-valuation-to-accelerate-fresh-food-supply-chains/>) being pumped into the development of the coating, there's an enormous amount of positive press (<https://www.wired.com/story/apeel/>) along with the fact that there's huge excitement over the potential to do away with a lot of plastic packaging. UK supermarket chains Tesco (<https://www.tescopl.com/news/2022/tesco-to-trial-apeel-plant-based-protection-for-fruit-to-extend-shelf-life-and-reduce-food-waste/>) and Asda (<https://inews.co.uk/news/consumer/asda-fruit-coating-improve-shelf-life-produce-336775>) are already trialling the product, along with avocado producers (<https://resource.co/article/avocados-preservative-coating-launch-europe>) to extend the shelf life of its fresh produce.

The majority of concerns thus far centre around the safety of the product. Perhaps more concerning is the potential lack of choice for consumers that might not want to consume produce coated in Edipeel, as supermarket chains and others get sucked into the hype. Particularly, as the coating has also been approved for use on organic produce (https://www3.epa.gov/pesticides/chem_search/ppls/092708-00001-20190607.pdf) in the US further reducing consumer options and it can't be removed (<https://www.apeel.com/faq>) even by scrubbing the produce. It's not known whether any elements of the coating can be absorbed by the vegetables or fruit that have been coated.

Should food last 'forever'?

Apeel Science's Twitter account (<https://twitter.com/apeelsciences>) asks, "*What if instead of going bad, food went good? Lasting longer, to create less waste? Plant-based protection. Longer-lasting produce.*"

Perhaps the question should be – how far should we go to extend the lifespan of vegetables and fruits? Should we be trying to cheat Nature's sell by dates?

Edipeel is described as a colourless, odourless, tasteless coating for fruit and vegetables that's composed entirely of a mixture of food grade glycerolipids, derived from edible plant oils (<https://a.storyblok.com/f/157795/x/743e5a90ed/united-states-edipeel-product-information-sheet.pdf>), that we're assured is entirely safe to eat (hmmm ring any bells?). The coating slows down water loss and oxidation keeping the fruit and veg fresher for up to two times longer.

Images used in Apeel's submission to the Australian Food Standards Agency,

(<https://www.foodstandards.gov.au/code/applications/Documents/A1191%20Application%20dossier.pdf>) show lemons that are 60 days old looking almost as fresh as the day they were picked.

Read the marketing hype (<https://www.apeel.com/blog/whats-in-a-peel>) and you'd be forgiven for thinking Edipeel is made from plant-derived materials such as peels, seeds, pulp and stems from fruits and vegetables that have already processed or leftover-after-harvest. The reality is somewhat different. Edipeel utilises an emulsifier known as E471 (<https://foodadditives.net/emulsifiers/mono-and-diglycerides/>) composed of purified monoglycerides and diglycerides, which is widely used in highly processed baked goods, ice-creams and infant formulas to stop oil and water from separating and extend the shelf-life of products.

Generally recognised as safe

Is it safe? An extremely good question.

According to one of Apeel's submissions for GRAS recognition (<https://www.fda.gov/media/99218/download>) the primary components of Edipeel are 2,3-dihydroxypropyl palmitate (PA-1G) and 1,3 dihydroxypropan-2-yl palmitate (PA-2G).

Apeel is relying on existing science (<https://efsa.onlinelibrary.wiley.com/doi/full/10.2903/j.efsa.2021.6885>) used to approve the use of E471/mono- and diglycerides and the US Food and Drug Administration's (FDA) generally recognised as safe (GRAS) system. In fact it's considered so safe by regulators, no acceptable daily intake is considered necessary. According to Apeel's GRAS application (<https://www.fda.gov/media/99218/download>) individuals who eat large quantities of vegetables and fruit could, in theory, consume up to 218 mg/person/day. Even more if they include a lot of potatoes.

This reliance on existing scientific studies and regulatory approvals means no new science has been required to evaluate (https://www.researchgate.net/post/Has_anyone_done_any_scientific_research_on_the_advantages_of_the_fruit_coating_Apeel) the product or test produce coated with the product to see if it not only keeps it fresh on the outside but also protects the nutritional integrity of treated products.

Mono- and diglycerides are produced from plant oils, which have already gone through an extraction process, using a procedure (<https://www.hilarispublisher.com/open-access/progress-in-synthesis-of-monoglycerides-for-use-in-food-and-pharmaceuticals-2472-0542-1000128.pdf>) involving high temperatures and chemicals. Residues of ethyl acetate, heptane, palladium, arsenic, lead, cadmium and mercury from the production process are to be found in the mono- and diglycerides used in the product (<https://www.fda.gov/media/135999/download>).

Remarkably there appears to be no published research (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6899614/>) investigating the effects of emulsifiers containing mono- and diglycerides on our gut microbiota and researchers are now calling for further investigations into (https://www.researchgate.net/publication/342747991_Food_additive_emulsifiers_a_review_of_their_role_in_foods_legislation_and_classifications_presence_in_food_supply_dietary_exposure_and_safety_assessment) the potential adverse effects on metabolic and gut health.



Dose response

Given the amount of ultra-processed foods people already consume that are laden with a range of emulsifiers, E471 being one of the most commonly used, its use as a coating for fruit and vegetables only increases the potential for health issues to arise.

In order to apply the coating, fruit and vegetables must be sprayed or dipped in a solution. This could, potentially, result in some items having very little coating whilst others end up with a heavier coating as production processes are not always uniform.

As with so many things in small amounts, Edipeel may not cause an issue. High quantities, combined with nutrient poor ultra-processed foods containing E 471 and other emulsifiers, though, could lead to a tipping point into metabolic disease and gut dysbiosis. It's not just that the science isn't clear, it doesn't yet exist to show one way or another if mono- and diglycerides contribute to health issues. Yet regulatory agencies have blanket labelled these products as safe to eat.

Back to basics

At the end of the day, Edipeel is going to be rolled out whether we like it or not. The bottom line is that yes, this product will undoubtedly extend the life of fruit and vegetables, but at what overall cost to people's health?

Whatever the regulatory authorities say regarding the safety of mono and diglycerides in our food, they're a long way from the original plant compounds they're derived from. As far as our bodies are concerned, these are 'new to nature' compounds, even if they are widely consumed already with the inherent risks that come with such compounds.

The arrival of Apeel in the marketplace reminds us of the many reasons to prioritise our purchase and consumption of local, traditionally produced, organic (check with suppliers to see if they are using Apeel products), biodynamic and chemical-free foods wherever possible.