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# REALITY CHECK

THE SCIENCE BEHIND THE HEADLINES



REVIEW

## Olive mill wastewater: a health-boosting tonic hiding in the leftovers

A by-product of the olive oil production process is packed with compounds that lower your cholesterol and reduce your risk of developing cancer

BBC

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**O**live oil is well known for its health benefits. The star of the Mediterranean diet, it's rich in good fats, packed with antioxidants that have anti-inflammatory properties, and linked to a variety of improved health outcomes.

The olive oil production process does create a lot of waste products, though. Luckily, however, it seems one of them – olive mill wastewater – might be a potentially health-boosting product in its own right.

Admittedly, olive mill wastewater, or 'OMW' as it's typically called in the scientific literature, isn't a particularly appetising name for a trendy, new, nutrient-dense supplement. But, olive mill wastewater is exactly what the name suggests – the wastewater from olive oil production.

It's one of many byproducts created when olives are milled and the oil is separated and filtered. To reduce such byproducts and improve profits, the waste is 'valorised' – reused, recycled, composted or converted into more useful things that have value, including materials, chemicals or fuels.

The solid waste products from olive oil production – olive pomace, olive oil sediment, olive pit residue



## “The high level of organic compounds has potential health benefits”

and spent olive cake – can all be used as animal feed, compost or biomass fuel.

The liquid waste from the extraction process, which includes water added as part of the processing, is the olive mill wastewater, a dark, cloudy, bitter and slightly acidic liquid – millions of litres of which are generated each year. As a byproduct, it's considered the most harmful waste from olive oil production – its high organic load and phenolic content are a significant environmental concern. If it's not properly managed and treated before release (which adds to the cost of production), it can contaminate waterways and soil, and be toxic to plants and animals.

But olive mill wastewater might be more useful than most producers realise. One family-run farm in Tuscany, Italy is already selling olive mill wastewater as a health supplement shot and as a biodynamic cosmetics range called OliPhenolia. The shots are available in natural bitter and sweetened flavours, based on the traditional health tonic known as 'aqua mora' (an old Italian name for olive mill wastewater that roughly translates as 'dark water').

Scientists have also been looking into the contents of olive mill wastewater and how it might be used.

The high level of organic compounds it contains, known as phytochemicals – the very thing that makes olive mill wastewater harmful to the environment – has potential health benefits for humans. Phytochemicals are chemical compounds produced by plants as natural defences against environmental stressors and predators. These compounds, although not essential nutrients needed for survival, can have a positive impact on human health, earning them the broader name of bioactives.

### COSTS VERSUS BENEFITS

The bioactives in olive mill wastewater include 30 or more phenolic compounds such as tannins, flavanols, oleuropein, hydroxytyrosol and anthocyanins, plus soluble dietary fibres such as mucilage and pectin. These compounds have antioxidant, anti-inflammatory, immunomodulatory, antimicrobial, anticarcinogenic, anticholesterolemic, antihypertensive, antihyperglycemic, analgesic and other beneficial effects, including for gut health.

These compounds are thought to be part of the reason why plant foods are health-promoting, above and beyond the essential nutrients they contain. High consumption is linked to reducing risk of cardiovascular diseases, metabolic disease, diabetes, cancer and more.

Because many of these phenolic compounds are water soluble, the concentration can be up to 10 times higher in olive mill wastewater than in olive oil, with levels varying depending on pressing methods, storage and olive type.

This health-giving wastewater could be consumed as a drink, tonic or elixir, and there are extraction techniques that can concentrate the bioactives and nutrients to allow them to be used in other products. For the valorisation to be successful, these →

**ABOVE** Vast quantities of wastewater are produced during the production of olive oil

**LEFT** Olives and olive oil are packed with beneficial compounds. So, it seems, is one of the leftovers from the olive oil production process

## “History is littered with examples that prove how much we love a food trend, especially one with purported health benefits and a great origin story”

→ techniques need to be cheap enough to produce products of sufficient value to outweigh the costs associated with the treatment and discharge of waste.

Most of the research on olive mill wastewater is centred around its potential use as a nutraceutical. Nutraceutical is a portmanteau of the words ‘nutrient’ and ‘pharmaceutical’, and is used to describe products derived from food and plant sources with significant health benefits. Nutraceuticals are complex mixes of nutrients and bioactives, which can have synergistic effects. They can be used as supplements or added to foods to give them bioactive health benefits, or they can be used in food production as natural preservatives. In 2021, at least five companies were known to be recovering phenolic compounds from olive mill wastewater for use as a natural preservative or bioactive to add to food products and supplements.

So, can we expect olive mill wastewater to become the next wheatgrass or apple cider vinegar shot? Maybe.

**BELOW** The health benefits of olive oil are well documented

History is littered with examples that prove how much we love a food trend, especially one with purported health benefits and a great origin story. We also love the idea of ‘silver bullet’ supplements that claim to help protect us from a range of conditions.

### WEIGHING UP THE OPTIONS

It’s important to note that while multiple studies have been conducted with olive mill wastewater, they’ve all been carried out on cell cultures or microbes. No studies have yet been conducted on actual humans to assess if drinking olive mill wastewater, or consuming foods into which it’s been added, has any direct health benefits. There have been multiple studies conducted on humans to investigate the health benefits of olive oil, however.

So why not just eat the whole unprocessed olive? After all, they contain all the nutrients and bioactives found in both olive oil and olive oil wastewater, not to mention the dietary fibre that’s lost during the olive oil production process.

The problem is olives can’t actually be eaten fresh – they need to be processed via pickling or curing to make them edible. This means they’re soaked for a long time and can lose many of the beneficial compounds. Olives can also be very high in salt due to this process. But processing olives into oil and wastewater can help release the phytochemical compounds they contain, making them more available for absorption into the human body. Compared to olive oil, the health benefits of olives as a food aren’t actually very well studied.

Phytochemicals are plentiful in all plant foods, so can be readily accessed in a diet high in fruits, vegetables and wholegrains. Bioactive compounds are also many and varied – over 10,000 have so far been identified. This means consuming a specific bitter drink or extracting the bioactives for use in foods or other nutraceutical products for repeat consumption isn’t likely to be more beneficial alone than the combinations found in a healthy balanced diet. Eating whole plant foods also has the added benefit of displacing less healthful foods from a person’s diet, which doesn’t happen with tonics and supplements, as, typically, these are simply added to someone’s existing diet.

But, since most people aren’t eating plant foods at the levels recommended by national dietary guidelines and the World Health Organization, novel products may encourage the consumption of bioactives and nutrients, while simultaneously creating a valuable use for a common waste product.



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