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Nine gardening myths debunked

Burying a cow's horn filled with manure is one thing, but even some of the better known horticultural tips don't stand up to scientific scrutiny

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It is not true that water droplets on plants focus solar rays and burn foliage. Photograph: Kati Molin/Alamy

Is there a hobby anywhere that's more burdened with folklore and superstition than gardening? On any allotment you'll soon find someone convinced that potatoes must be planted on Good Friday, that garlic keeps aphids away, or that human hair wards off [eelworm](#).

The extreme version of this is biodynamics, the "holistic" approach to plants favoured by Prince Charles, which combines [organic gardening](#) with new-age magic. [Biodynamic gardeners](#) sow according to the moon and the zodiac. They spray homeopathic remedies, some of which must be prepared in a sheep's skull or a deer's bladder. And they [bury cow's horns filled with manure](#) and quartz to focus "vital forces".

Biodynamic gardening is dismissed by the Royal Horticultural Society, and likened to witchcraft by leading plant scientists. Yet it still has its adherents. Former Formula 1 champion Jody Scheckter owns one of more than 120 biodynamic farms in the UK. The patron of the Biodynamic Association is Patrick Holden, the former director of the Soil Association. And the Prince of Wales, in his 2010 book *Harmony*, described moon planting as part of "a profound knowledge neglected by modern techniques".

Of course, some of the old folklore is sound. Techniques of rotating vegetable crops and creating compost survived because they work. But other nuggets passed down the generations are nonsense and, in a culture where gardening folklore is venerated, quackery and snake oil thrive.

There are signs of a change. In the US four horticultural scientists have got together to produce the blog [Garden Professors, which exposes pseudo-science](#).

Dr Linda Chalker-Scott, of Washington State University and co-author of the blog, is passionate about exploding myths.

"As with many mythological practices, it can cause harm if the product is harvested or made in an unsustainable manner, if it causes environmental damage or it takes advantage of people's lack of knowledge and [affects] them financially," she says.

So what are the common myths that have been debunked by scientific research?

MYTH 1 Compost tea suppresses disease

If you believe the marketing, compost tea is the miracle additive of the 21st century. It is made by steeping compost in water mixed with sugar in brewing kits costing £30. The mixture is aerated to encourage organisms to grow before being sprayed on to plants. According to supporters, it increases plant growth, provides nutrients, adds beneficial organisms and suppresses disease. It is big in the US and is growing in popularity in the UK, fuelled by anecdotal evidence from gardeners.

Yet Dr Chalker-Scott remains unconvinced by the "fuzzy science" of compost tea. Six years ago her [review of scientific literature](#) found just seven studies on aerated compost tea. One suggested that bubbling air through the liquid reduced its efficacy, another that it was not effective in reducing apple scab and in some cases made scab worse. One suggested that it controlled fungi in a Petri dish, while three greenhouse tests had mixed results. Her own research on Washington State University cherry trees found that compost tea was no better than water.

Since then, a study led by Dr Bryant Scharenbroch at the Morton Arboretum Soil Science laboratory in Lisle, Illinois, and published in *Arboriculture and Urban Forestry*, suggested that [compost tea was inferior to fertiliser at enhancing microbe activity in the soil](#).

Dr Jeff Gillman, a Garden Professors blogger and horticultural scientist at the University of Minnesota, likens it to a "magical elixir". "There is limited data showing it can be useful, but the bulk of data shows it is not beneficial," he says. "What is more concerning is that some of the data shows these buckets can provide a breeding ground for *E coli* bacteria and disease."

MYTH 2 Lighten clay by adding sand

Clay soil can be a gardening nightmare. It turns rock-hard when dry, drains badly, takes an age to warm up in spring and is tough to cultivate. However, it holds its nutrients better than most types of soil and, if drainage can be improved, it produces bountiful plants.

Soil is a mix of minerals, organic matter, water and air. The balance of those ingredients – and particularly the ratio of sand, silt and clay – affects quality dramatically.

Gardeners coping with particularly heavy clay soil are sometimes tempted to lighten it with sand. According to plant scientists, that will often make it worse. Leigh Hunt of the RHS says: "You need almost as much sand as you have clay. So people often do it on a limited scale – they dig a small area of half a square metre and incorporate sand. And that's where the problems start."

Sand particles are bigger than clay particles. As a consequence, clay is relatively impervious, while sand soils can absorb plenty of water.

Digging a hole and adding sand can create a sump that draws in water, drowning plants.

Converting a garden is a mammoth task. The RHS estimates that you would need 250kg of sand or grit for every square metre of clay soil.

"The best thing to do in this situation is to make a raised bed and then add the sand so the water has somewhere to go," says Hunt.

MYTH 3 Young trees should be staked

Tough love doesn't just apply to children – it also works for trees. While it may be tempting to secure a sapling to protect it from the wind, stakes can weaken plants. Leigh Hunt, an adviser at the Royal Horticultural Society, recommends that saplings be staked for the first year to 18 months. "After that you want to remove the stake because the tree can become reliant on it and you get a tree that is not as strong and stable," he says.

Botanists showed in the 1950s that trees allowed to sway with the wind grew thicker lower trunks than those staked. They also tend to have thicker branches, but don't grow

as tall. In horticultural circles, the response of trees and plants to wind is called thigmomorphogenesis. The buffeting from winds releases ethylene gas, a growth mediator that triggers the formation of wood-strengthening lignin.

The RHS advises placing stakes at a 45-degree angle. They should be positioned so the prevailing wind blows the tree away from the support.

MYTH 4 Sun through water burns leaves

There are many good reasons to avoid watering plants in the sun. But sunburn is not one of them.

The belief that water droplets on plants focus solar rays and burn foliage has persisted for generations. However, in 2010 Dr Gábor Horváth and colleagues at the Eötvös University in Budapest found that water droplets were too close to leaves to cause burning before they evaporated. The only risk was on hairy plants such as ferns, which kept the droplets far enough away to act as lenses, they reported in *New Phytologist*.

Guy Barter said: "In 20 years of professional gardening, I've only seen it once and that was on French beans that we had watered from overhead. In the summer outdoors, it is best to water in the afternoon and evening to reduce the amount of evaporation. If you use a sprinkler system with a timer, it's best to do it before dawn because there tends to be less wind and it is cooler."

MYTH 5 Tree wounds need dressing

Countless generations of gardeners have painted tar or paint on wounds after lopping off branches. It was believed that, without protection, trees would be vulnerable to pests and disease. That myth was conclusively debunked in the 1970s and 80s by Dr Alex Shigo of the US Forest Service. Shigo was a passionate tree specialist whose theory of compartmentalisation of tree decay changed the way trees are pruned. He showed that, when trees are injured, they respond with chemical and physical changes, forming barriers that stop or slow the spread of disease and decay to the rest of the plant.

In 1983 in the *Journal of Arboriculture*, Shigo published results of 13 years of research on wound dressings. Applying tar does nothing to aid this process but can provide a home and protective layer for pests and fungi, he showed. It also inhibits the process of compartmentalisation.

MYTH 6 Biodynamic is best

The biodynamic movement was founded by Austrian teacher and occultist Rudolf Steiner in 1924. His system uses astrology to give days characteristics based on the classical elements of earth, water, air and fire. Carrots should be planted on an earth day, for instance, and apples on a fire day. There are complex preparations to spray on soil and crops, including homeopathic liquids based on healing herbs. The burial of a horn full of quartz or dung is said to harvest "cosmic forces". Supporters talk about energy levels, cosmic forces and vibrations. Alongside the magic is a strong organic principle. But does it work?

Teasing out the effects of organic farming from the mystical elements has been difficult. A Slovenian PhD student, Matjaz Turinek, for instance, concluded in 2011 that biodynamic farms had higher-quality soil than conventional ones. However, critics say that owes more to organic practices than to any spreading of potions.

A 21-year-long study led by Dr Paul Mader at the Research Institute of Organic Agriculture in Switzerland, published in *Science* in 2002, found that the soil quality in biodynamic fields was better than in conventional or organic fields but yields were lower.

The Royal Horticultural Society's science committee cannot find a scientific basis for planting by the moon. The Rothamstead Research Centre repeated the cow's horn recipe; after six months, it was still just unfermented silica and manure.

Professor Tony Trewavas, a plant scientist at the Institute of Cell and Molecular Biology, University of Edinburgh, said: "Vital forces don't exist, nor does the moon exert some special influence on seedling growth."

"Biodynamic farming does emphasise soil maintenance but any good conventional farmer does the same, without the rigmarole of vital forces."

MYTH 7 Gravel helps containers to drain

It is standard practice when filling a container to place stones or pieces of pot at the bottom "for drainage". But the evidence suggests that not only is it a waste of time, but it also restricts plant growth and results in roots sitting in water. Gilman says: "You have less space and the drainage is not as good, because water sits above the gravel or the stones."

Soil holds moisture better than gravel does. Water will cling to the fine particles in soil until it is completely saturated. Only then does it drain away. As long as there is a hole in the bottom of the container, water will find its way out without the need for stones. The only benefit to putting a piece of crockery in a container is to cover the hole to stop the compost escaping.

MYTH 8 Add bone meal and compost when planting trees

Gardening books often recommend adding bone meal to soil before planting a tree or shrub. The Garden Professor bloggers say that is a waste of time. Although bone meal contains calcium and phosphorus, which are needed for plant growth, the minerals are rarely in short supply in gardens or allotments.

Chalker-Scott says: "It does not stimulate plant growth. It is only a mineral, not a plant growth regulator."

A high concentration of phosphorus may do harm by inhibiting beneficial mycorrhizal fungi, she adds. These fungi occur naturally in the soil and create a secondary root system, drawing water and nutrients from the soil. If the fungi don't appear, trees and shrubs compensate by growing extra roots, at a cost to the rest of the plant.

Compost can also be harmful in holes dug for new trees.

Guy Barter, chief horticultural adviser at the RHS, says: "The compost rots and the tree settles down too far in the soil and as a result root and stem rot can set in. It's best to plant trees in plain old soil."

MYTH 9 Natural is safer

Pesticides may be against the spirit of organic gardening, but garden centre shelves are full of organic treatments for insects, slugs and fungi. Although they are labelled "natural", that doesn't make them friendly to the environment. Dr Gillman believes that gardeners all too often swallow the myth that organic is safe. Some natural home-made organic pesticides contain 20% vinegar, which is effective at killing the tops of plants, but not their roots, he said. It is also toxic for frogs and toads.

"The one I get upset about is Bordeaux mix, which is an organic treatment for potato blight and contains copper," he said. "We talk about how organic sprays break down in the soil, but copper is copper. It builds up and it can be harmful."

Another common organic bug killer is pyrethrum, made from an extract of chrysanthemum correct. Natural it may be; discriminating it is not. It will kill beneficial ladybirds and bumblebees as easily as it kills asparagus beetle.

"The idea behind organic gardening is good but, when you talk about pesticides, just because something is organic that does not mean it is safe. Every pesticide must be examined individually," says Gillman.