

Gracie, Jenny and Weatherall, Andrew ORCID: <https://orcid.org/0000-0002-8413-1539> (2019) Do plants eat dirt? The Naked Scientists .

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# Do plants eat dirt?

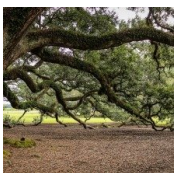
21 January 2019 / Presented by **JENNY GRACIE**.



*Credit: Pixabay, CC0*

Marcus was wondering how trees, such as giant oaks, can grow so huge and not make a hole in the ground. Where does their mass come from if not from the dirt? Jenny Gracie has been digging deep to find an answer, with help from Andrew Weatherall from the National School of Forestry at the University of Cumbria...

## IN THIS EPISODE



**00:00 – Do plants eat dirt?**

Why don't plants leave a hole in the ground when they grow?



PLAY

## Do plants eat dirt?

Marcus was wondering how trees, such as giant oaks, can grow so huge and not make a hole in the ground. Where does their mass come from if not from the dirt? Jenny Gracie has been digging deep to find an answer, with help from Andrew Weatherall from the National School of Forestry at the University of Cumbria...

Andrew - Whilst it is rather wonderful to visualise plants having a tiny mouth at the end of each root, a kind of upside down Venus flytrap, the short answer is no, plants do not eat soil. As anyone with houseplants will have learnt, you do not have to go around topping pots up with soil as plants grow.

The proof that plants do not eat soil is attributed to a 17th century scientist called Jean Baptiste van Helmont. Van Helmont weighed a willow before planting it in a known weight of dried soil, five years later he re-weighed the tree, dried the soil and re-weighed that too. The willow had increased in mass, but the soil had not decreased. He might have thought that the soil had replenished in some mysterious way, but van Helmont actually concluded that the increase in weight 'arose out of water only'.

Jenny - Evan\_au on the forum also told this story about the willow experiment, and noted that the main mass of a tree is the water and cellulose content. Cellulose provides plant structure and is made up from long chains of carbon, oxygen and hydrogen. But did this really all come from just water?

Andrew - Despite his careful experimentation, this is unfortunately also the wrong answer. We now know that whilst plants derive water and nutrients from soil, their mass comes from air in the presence of sunlight. Einstein's  $E = mc^2$  is the most famous formula in the world, but as a forester, my favourite is the net photosynthesis equation in which sunlight converts carbon dioxide and water into glucose and oxygen. Glucose is a sugar and this acts as a food source allowing trees like oaks to grow so huge, and the oxygen, well that keeps us going!

Jenny - On the forum, ChiralSPO agreed with this reasoning and wrote, "water and carbon dioxide from the air are the raw materials that account for most of the mass of a tree".

So there's our answer...photosynthesis: when plants need more food, they just have a light snack!

Next time we're considering this question from Bree.

Bree - If a person is born completely deaf and can't hear anything, what language do they think in?

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