

# Want bigger plants? Get to the root of the matter

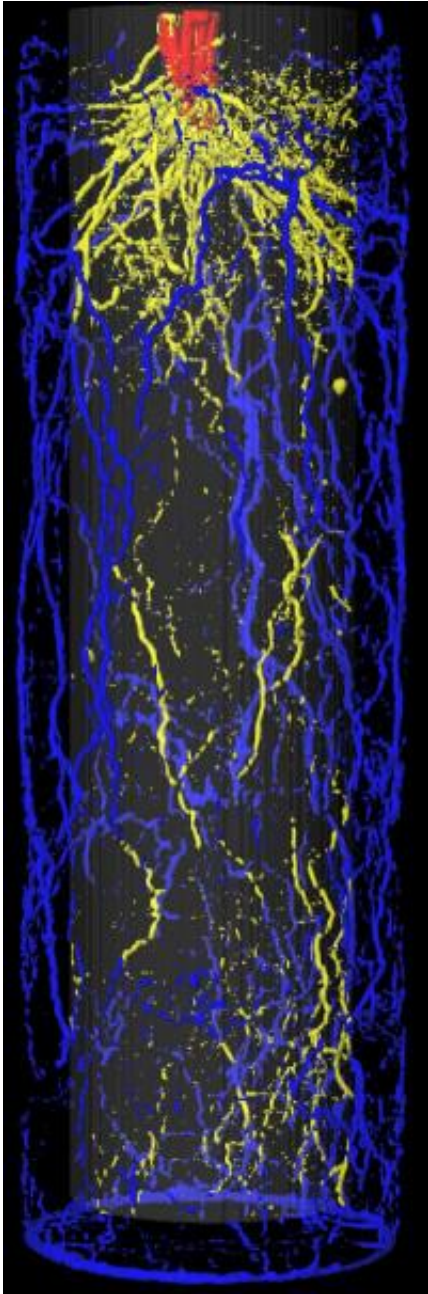
June 30 2012

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Plant scientists have imaged and analyzed, for the first time, how a potted plant's roots are arranged in the soil as the plant develops. In this study, to be presented at the Society for Experimental Biology meeting on 30th June, the team has also found that doubling plant pot size makes plants grow over 40% larger.

From their 3-D [MRI](#) root scans, the researchers observed that [potted plants](#) quickly extend their roots to the pot's walls. It is likely that the plants use their roots to 'sense' the size of the pot, although the details of how the roots relay the message about the pot's size remain the plants' secret.

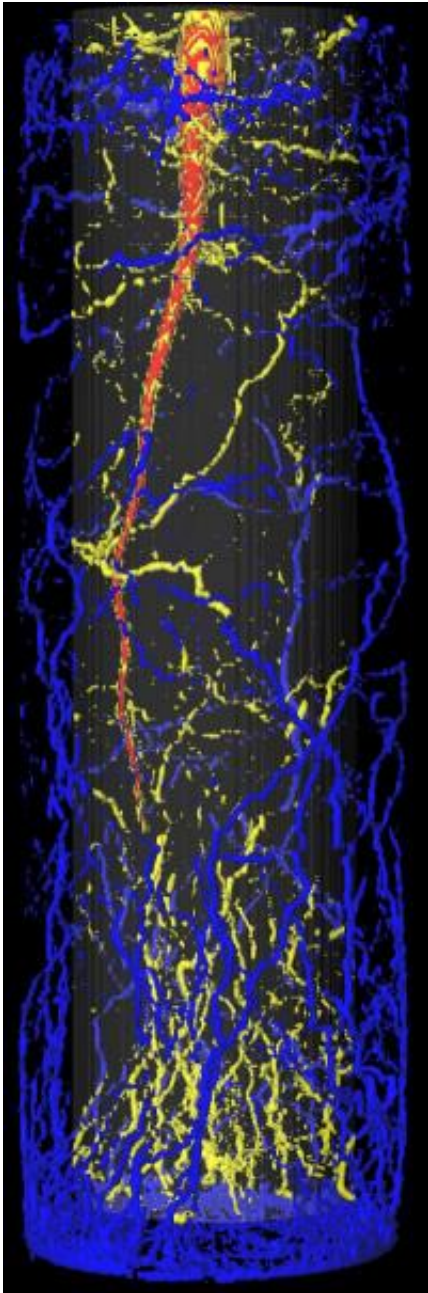
They also looked at 65 independent studies across a wide range of species including tomato, [corn](#), [pine tree](#), cactus, [wheat](#), and [cotton plants](#), and found that all species reach larger sizes when grown in a bigger pot. On average, doubling pot size allowed plants to grow 43% larger.



This image shows the roots of a barley plant in a cylindrical pot imaged by MRI 44 days after sowing. Blue roots are in the outer 50 percent of the pot volume, yellow roots are in the inner 50 percent of the pot volume, the stem of the barley plant is in red. Credit: Jonas Bühler

Dr Hendrik Poorter (Forschungszentrum Jülich, Germany) who led the

study, said: "There has been commercial interest in seeing how small pots can be, but our aim was to see how big a pot needs to be to avoid affecting plant experiments."



This image shows the roots of a sugar beet growing in a cylindrical pot, imaged by MRI 44 days after sowing. Roots in blue grew in the outer 50 percent volume of the pot, roots in yellow grew in the inner 50 percent pot volume, and the

storage organ of the sugar beet is in red. Credit: Jonas Bühler

The work is relevant for gardeners too. Poorter added, "After this study, I immediately changed the pot size for all the plants I had in my house."

To understand the pot size effect, the scientists looked at various aspects of the plants' growth. They found that the plants in smaller pots grew more slowly because of a decreased rate of photosynthesis. But, looking for causes for the decrease, the scientists ruled out limitations in water and nutrients and did not find any differences in the thickness of the leaves for plants in smaller pots. It is therefore unlikely that the plants use water and nutrient levels to sense the pot size, supporting the possibility that sensing happens another way, such as by the roots.

Provided by Society for Experimental Biology

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