

The color of lettuce determines the speed of its antioxidant effect

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Lettuce is a food that greatly benefits health, mainly because it is rich in antioxidants. But not all lettuce varieties have the same antioxidant effect. According to a study led by the researcher Usue Perez-Lopez of the University of the Basque Country, the color of the leaves of these vegetables determines the speed at which their compounds act. So lettuces with green leaves have antioxidants that react more slowly while red-leaf ones have a faster effect.

Antioxidants provide long-term protection against the chain reactions of free radical processes, in other words, of the molecules that are capable of causing cell damage and generating various diseases. Free radicals harm our body by causing, in the best of cases, ageing and, in the worse, serious diseases. Lettuce is rich in antioxidants, as it contains compounds like phenolic acids, flavonoids, anthocyanins, and vitamins A and C, among other things.

Green, semi-red and red leaves

To conduct this research, which started in 2011 and in which researchers of the UPV/EHU and the University of Pisa (Italy) have been participating, the compounds of three lettuce varieties were analysed: the green-leaf 'Batavia', the semi-red-leaf 'Marvel of Four Seasons', and the red-leaf 'Oak Leaf'. Using Electron Paramagnetic Resonance (EPR) techniques, they were able to observe the behaviour of the kinetics of the compounds of each variety. And the results show that the green-leaf

lettuce contains water-soluble, [antioxidant compounds](#) that act at a slow and intermediate speed, the red-leaf one has compounds with intermediate and rapid kinetics, and the semi-red-leaf one has three kinds of compounds, with a rapid, intermediate and slow speed.

As Dr Pérez-López, researcher of the Department of Plant Biology and Ecology of the UPV/EHU's Faculty of Science and Technology, stressed, "the fact that there are compounds that act at different speeds does not mean that some are better or worse than others. If we eat foods that can generate free-radical activity, there will be some compounds that act to eliminate them more quickly. But at the same time, it is also important that our bodies should acquire foods with antioxidants that have slower kinetics so that the latter will continue to act over a longer period of time. That is why people say that it is very interesting to mix different types of lettuce because they have different, complementary characteristics".

Boosting the properties

Having determined the kinetics of the [antioxidants](#), the research is currently continuing with the aim of achieving a nutraceutical improvement of these three varieties of lettuce. The research group is now trying to boost the effect of the specific compounds in each variety by subjecting the plants to short stresses. These [compounds](#) perform defence functions in plants. So if conditions that are not the normal ones are applied to them (such as watering them with salinated water, subjecting them to high lighting intensity or working with raised concentrations of CO₂), these defences will become intensified and, as a result, the antioxidant qualities of the plants will be boosted.

"What matters in this process is not to lose productivity, and that is why we apply short-intensity stresses. With excessive stress, we could reach a point in which plant growth is reduced, and we are not interested in

achieving greater quality at the cost of a reduction in size. The aim is to maintain production and achieve greater quality in this production," pointed out Dr Usue Pérez-López.

More information: Usue Pérez-López, Calogero Pinzino, Mike Frank Quartacci, Annamaria Ranieri, Cristina Sgherri. Phenolic Composition and Related Antioxidant Properties in Differently Colored Lettuces: A Study by Electron Paramagnetic Resonance (EPR) Kinetics. *Journal of Agricultural and Food Chemistry*. [DOI: 10.1021/jf503260v](https://doi.org/10.1021/jf503260v).

Provided by University of the Basque Country

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