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Grasses 'can help grow healthier blueberries'

Intercropping with grasses an effective and sustainable alternative to chemical treatments for maximising yield and antioxidant content

Blueberries are prone to iron deficiency and correcting this increases their antioxidant content and boosts yields, Chilean researchers have discovered.

Published in Frontiers in Plant Science, their study shows that growing grasses alongside blueberry plants tackles iron deficiency, with associated improvements in berry quantity and quality.

The effects are comparable to those seen following standard chemical treatment, but the researchers believe they could provide a simpler, safer, cheaper and more sustainable strategy for blueberry farming on sub-optimal soils.

All soils are rich in iron, but nearly all of it is insoluble, and unlike other plants, blueberries struggle to absorb iron from the soil.

"Most plants get enough iron by secreting chemicals that make it more soluble," explained senior study author Dr José Covarrubias, who is an assistant professor of agriculture sciences at the University of Chile.

"These iron 'chelators' can be released directly from the roots, or from microbes that grow among them, and allow the iron to be absorbed.

"Blueberries, however, lack these adaptations because they evolved in uncommonly wet, acid conditions which dissolve the iron for them."

As a result, most of the world's relatively dry or alkaline ('limey') cropland is unsuitable for optimal blueberry growth.

"Iron is essential for the formation and function of plant molecules like chlorophyll that allow them to use energy," Covarrubias added. "That's why iron deficiency shows up as yellowing leaves – and drastically reduces plant growth and yield.

"And in blueberries, iron-dependent enzymes also produce the 'superfruit' antioxidants responsible for their celebrated blue skin and health-enhancing effects."

There are two approaches to correcting iron deficiency in blueberries: acidifying the soil, or adding synthetic iron chelators, but each has its drawbacks, according to Covarrubias, who suggests intercroipping with grass instead.

"Grasses – which are well-adapted to poor soils – can provide a sustainable, natural source of iron chelators via their roots when grown alongside fruiting plants," he said.

"Intercropping with grass species has been shown to improve plant growth and fruit yield in olives, grapes, citrus varieties – and most recently, in blueberries.

"We found the association with grasses increased not only the total weight and

number of blueberries per plant, but also the concentration of anthocyanins and other antioxidant compounds in their skins, compared to control.

"The effect sizes were comparable with the proven synthetic chelator Fe-EDDHA, whereas applications of Fe-heme from cow's blood – a fertilizer commonly used in home gardens – had no significant effect."

The beneficial effects paralleled improvement in the plants' iron status, as indicated by leaf colour, which was also comparable between the grass-associated and the Fe-EDDHA-treated plants.

However, none of the treatments had a significant effect on average berry weight.

A potential limitation of intercropping observed in the study was a decrease in berry firmness, since firmer berries are favoured by consumers.

Intercropped plants also required an additional water supply to maintain a similar soil moisture to other treatments, but plant management was otherwise straightforward and the same across groups.

The grasses were kept cropped between 5cm and 15cm – a typical range for an mown lawn.

"Our findings validate intercropping with grasses as a simple, effective, sustainable alternative to standard iron correction strategies in blueberries," concluded Covarrubias.

"Both commercial and private growers can put this strategy to use right away to boost their blueberry crop and antioxidant content."