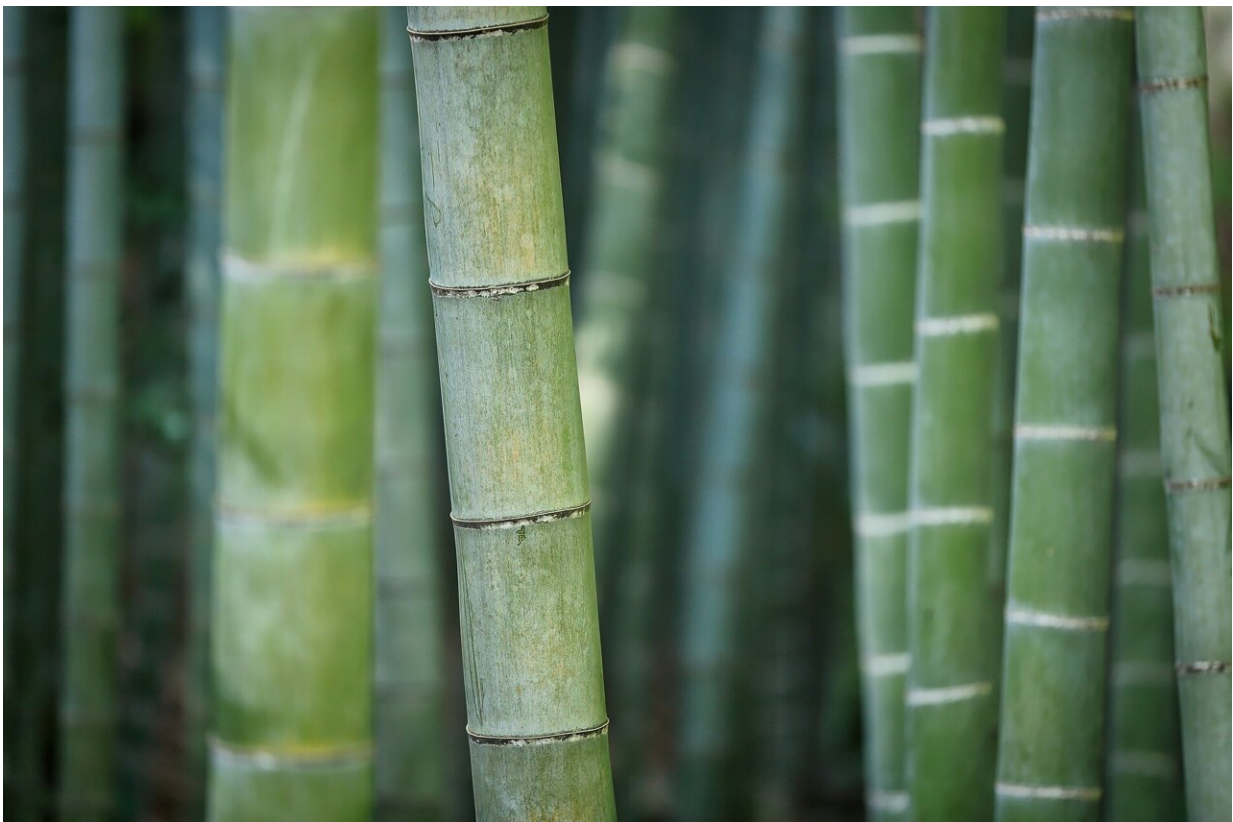


Agronomists protect plants from heavy metals with hormone therapy and the mineral zeolite

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RUDN University agronomists have shown that the hormone melatonin and the mineral zeolite mitigate the dangerous effects of heavy metals on

plants. The first protects cells from destruction by cadmium, and the second increases nutrient availability and prevents the absorption of hazardous metals into the plant. [The results](#) were published in *Scientia Horticulturae*.

Recently, there has been a dangerous increase in the concentration of heavy metals in plant shoots. One of the major pollutants is cadmium. It enters the soil along with industrial and [agricultural waste](#). RUDN University agronomists have found that the [hormone melatonin](#) and the mineral zeolite help mitigate cadmium contamination. Individually they have been shown to have positive effects on plant and soil health, but little is known about their combined effects.

"Hazardous metals are the main cause of contamination of agricultural and forest soils. Pollution affects food and puts people's health at risk. Cadmium gets into the environment through pesticides, chemical production, and mining. It changes nitrogen and [carbohydrate metabolism](#) in plants, disrupts the cells permeability damaging their membranes," said Meysam Zargar, Ph.D., Associate Professor of the Department of Agrobiotechnology at RUDN University.

Agronomists experimented using [bamboo](#) as an example, which grew for a year in soil with a high cadmium level. Contamination ranged from 9 to 200 milligrams of cadmium per liter. They sprayed bamboo of all groups with varying amounts of melatonin and zeolite.

Zeolite and melatonin neutralized cadmium contamination in bamboo, increasing the nutrient content of the soil. The amount of phosphorus and nitrogen increased by 23%, magnesium by 20%, calcium by 15%, and potassium by 10%. Agronomists named 150 micromoles of melatonin and 15 grams of zeolite as the optimal dose of supplements. In this combination, these substances improve the antioxidant system of plants, which suffer from high cadmium content, and increase the

availability of nutritional components.

"Melatonin and zeolite completely compensate for the harmful effects of cadmium on bamboo. Zeolite in the soil can immobilize [cadmium](#), reducing its accumulation in bamboo and promoting the absorption of nutrient ions by roots. Melatonin mitigates the manifestations of oxidative stress by increasing [antioxidant activity](#) and protects cells by regulating permeability," said Meysam Zargar, Ph.D. Doctor of Agricultural Sciences, Associate Professor of the Department of Agrobiotechnology at RUDN University.

More information: Abolghassem Emamverdian et al, Co-application of melatonin and zeolite boost bamboo tolerance under cadmium by enhancing antioxidant capacity, osmolyte accumulation, plant nutrient availability, and decreasing cadmium absorption, *Scientia Horticulturae* (2023). [DOI: 10.1016/j.scienta.2023.112433](https://doi.org/10.1016/j.scienta.2023.112433)

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