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Farmers’ and academia’s views”

## Influence of soil extractable nutrients on the walnut fruit ionome in southern Kyrgyzstan at different elevations

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### Abstract

The impact of climate change on ecosystems and plants is one of the main future challenges and due to altered precipitation and temperature increase may alter food quantity and quality. The expected changes in temperature may influence walnut plant physiology and thus fruit quality, as well as soil processes, such as mineralisation and therefore nutrient provision for plants. Increasing temperatures in Kyrgyzstan thus might result in changes of walnut quality in general and in particular in their nutrient content. Our research aims to investigate the influence of available nutrients in the soil on the nutrient content of walnut fruits (*Juglans regia* L.) in the walnut forests of Southern Kyrgyzstan. Soil samples were collected from top- and subsoils at three elevation levels (1000, 1300 and 1600 m above sea level) with similar vegetation but differences in average temperature as caused by elevation, acting as a proxy of future climate (low elevation representing future climate for higher sites). Walnut samples were collected from the same sampling sites and both, soil and walnut samples were analysed for soil physical and chemical properties. All soil properties showed high variability within sites but no differences between elevation levels. Physical properties of walnuts did not reveal any major difference along elevation either. Walnut fruit Ca and K content differed significantly between low and high elevation, however there was no difference observed for other elements. Elements in walnuts such as Zn, Mn, Cu and Na correlated with plant available soil Zn, Mn, Mg and Na, revealing a close relationship between some soil extractable plant nutrients and the plant ionome. However, differences in average temperature as caused by elevation did not affect available plant nutrients or the walnut fruit ionome. Temperature increase due to climate change may not affect walnut quality in the investigated forest systems. However, climate change effects, such as drought or altered precipitation patterns may influence walnut fruit development and should be subject of future investigations.

**Keywords:** Climate change, *Juglans regia*, Kyrgyzstan, plant available nutrients, soil, walnut