
Iodine in the plant: there's more going on than is usually realised: a literature review

Alex Stewart*¹

¹University of Exeter – Geoffrey Pope Building, Mezzanine Office, Stocker Road, Exeter EX4 4QD, United Kingdom

Abstract

Iodine deficiency disorders can occur in any society. While iodinated salt has improved the outcome for many, we lack an understanding of how the environmental cycle of iodine influences human and animal health, in particular, how iodine reaches the diet in adequate amounts. As part of a wider review, the role of iodine in plants is examined here. The amount of iodine intercepted by vegetation decreases with increasing rainfall, depending on the combined influence of biomass, amount, and intensity of rainfall; vegetation type is less significant. Transfer rates of gaseous I₂ from the atmosphere are largely constant across plant species.

Different species accumulate at different rates through their roots; leafy vegetables absorb more than fruiting vegetables. Root iodine concentration > leaf > stem; across all tissues cytoplasm concentration > cell wall > organelle.

Iodine can be beneficial to plant growth: barley growth increased by I⁻ > IO₃⁻ > IO₄⁻ (1.0 ppm growth medium). In peas, 1.0 ppm iodine inhibited growth; I⁻ being more toxic than IO₃⁻. Many species suffer from iodine toxicity ("reclamation Akagare disease").

The xylem transport mechanism (passively from roots in pillars of dead cells) transports iodine, phloem (active transport by living cells from leaves) does not. I⁻ is more easily absorbed by roots than IO₃⁻. Soil microbes convert IO₃⁻ to I⁻ and encourage absorption by roots.

Biofortification of plants with iodine has been attempted as an adjunct to iodinated salt, but few studies take full account of atmospheric deposition and within-plant transfer mechanisms.

Conclusion: The relationship of iodine and plants depends on plant species, iodine species, growth medium concentration, soil type, atmospheric dynamics, and the two plant transport mechanisms. Too many studies are too narrow in focus: greater thought needs to be given to multivariate issues in the relationship of iodine geochemistry to health.

Keywords: iodine, plants, deposition, uptake, diet

*Speaker