

# Uptake, Metabolism and Toxicity of Selenium in Tropical Plants

Written By

Abiodun Humphrey Adebayo, Omolara Faith Yakubu and Osarobo Bakare-Akpata

## Abstract

Selenium is a mineral element that is essential for both animal and humans and can also serve as an environmental toxicant. A narrow margin exists between an ideal and toxic intake of selenium. It is a useful microelement existing in minute amounts in animals, plants, microorganisms and humans. Although it is beneficial to both animals and humans as an antioxidant, it can be toxic at high concentrations as a result of it competing and replacing sulfur in amino acids leading to inappropriate folding of protein and eventually creating a nonfunctional protein and enzymes. Selenium exists in organic forms as SeMet and SeCys and inorganic forms as selenide, selenite and selenite in the environment. It is translocated in plants via the sulfate transporters in the plasma membrane of the plant root. Its translocation and distribution however depends on the plant species, their different developmental phases, forms, concentration and other physiological conditions like pH. Inorganic selenium is first converted to selenite via the action of two different enzymes (ATP sulfurylase and APS reductase), selenite is further converted to selenide by sulfite reductase. Selenide eventually couples with O-acetyl serine via the action of cysteine synthase to form SeCys. SeCys can either be methylated to methyl-SeCys through the action of selenocysteine methyltransferase or to elemental selenium via SeCys lyase or converted by a series of enzymes to selenomethionine. Selenium toxicity or Selenosis can occur when the optimal concentration of selenium is exceeded. Two major mechanism of selenium toxicity exists; either by induction of oxidative stress or malformation of selenoproteins. Selenium uptake, metabolism and toxicity in tropical plants are hereby discussed in this chapter.

## Keywords

- selenium
- distribution
- toxicity
- tropical plants