COMMENTARY

Aluminium toxicity and its tolerance in plant

Victor Soriano Viana*

Viana VS. Aluminium toxicity and its tolerance in plant. J Plant Biol Agri Sci. 2021;3(3):3.

DESCRIPTION

Aluminum (Al) is the most abundant metal in the crust, accounting for about 7% of its mass. Since many plant species are sensitive to micromolar concentrations of Al, the potential for soils to be Al toxic is considerable. Fortunately, most of Al is bound to a ligand or occurs in other non-phytotoxic forms such as aluminosilicates and precipitates. However, this solubilization of Al is enhanced by low pH, and Al toxicity is a major factor limiting plant production in acidic soils. Soil acidification can occur naturally when basic cations leach out of the soil, but can be accelerated by some cultivation methods and acid rain (Kennedy, 1986). Strategies for maintaining production in these soils include using lime to raise the pH of the soil and using plants that are resistant to acidic soils. Al toxicity has been identified as a problem in acidic soils for over 70 years, but knowledge of the major toxic strains and the sequence of events that ultimately affect plant growth remain largely speculative.

The toxicity of aluminum (Al) is one of the largest abiotic stress problems in the world in the presence of acidic soils. Al has a toxic effect between soil pH 4.5 and 5.5. Inhibition of root growth is the most surprising symptom of Al toxicity in plants. The toxicity of aluminum adversely affects plant growth and development, ultimately reducing yields. However, the level of toxicity depends on the genotype of the plant. That is, plants are either Al-sensitive or Al-resistant. Plants have several mechanisms to combat the toxic effects of aluminum, including exclusion and internal tolerance mechanisms. This describes the harmful effects of aluminum on the morphological, anatomical, physical biochemical and molecular aspects of plants.

Aluminum toxicity

The most commonly recognized symptom of A1 toxicity is inhibition of root growth, which is a widely accepted measure of A1 stress in plants. In simple nutrient solutions, micromolar Al can begin to inhibit root growth within 60 minutes. However, stunting itself provides little information about the causes of stress that precedes or coincide with changes in growth. To understand the mechanism of Al toxicity, it is important to identify the major anatomical and metabolic sites, keeping in mind that Al has different effects and may act differently depending on the species.

Aluminum tolerance

There is significant variability in Al tolerance within few species and this has been beneficial to breeders in growing Al-tolerant cultivars of numerous crops, in addition to researchers studying the physiology and biochemistry of Al tolerance. Wheat has proved to be in particular beneficial on this respect, with as much as 10-fold variations in A1 tolerance among genotypes. Although a few wheat cultivars own some of foremost and minor genes that encode for Al tolerance, near-isogenic strains advanced to vary at a single Al-tolerance locus offer simplified structures for the study of Al tolerance mechanisms.

CONCLUSION

The intentional loss of different genes within the derivation of those strains avoids complication of several different mechanisms contributing to the tolerance. Much of the work on Al tolerance has centered on wheat and maximum of the subsequent dialogue is confined to describing current tendencies in our expertise of Al tolerance on this species.

Department of General Biology, Federal University of Viçosa (UFV), Viçosa, MG, 36570-900, Brazil

Correspondence: *Victor Soriano Viana, Department of General Biology, Federal University of Viçosa (UFV), Viçosa, MG, 36570-900, Brazil, E-mail: vitorbpsv@uenf.br*

Received date: *November 30, 2021*; **Accepted date:** *December 14, 2021*; **Published date:** *December 21, 2021*