

Aluminium Toxicity

Aluminium becomes available in acid soils. It stunts plant roots and reduces growth and persistence of pastures and crops. In addition, aluminium toxicity reduces options for the types of crops and pastures that we can grow in acid soil.



How does aluminium toxicity affect plant growth?

Aluminium has a toxic affect on plants by reducing root structure and functioning. The reduction in root growth reduces the plants ability to take up nutrients from the soil and stunted plant top growth occurs. Because aluminium tends to "tie up" phosphorus in the soil, the plant begins to show symptoms of phosphorus deficiency as well. In addition, plant water use is reduced and perennials fail to persist because of reduced root access to subsoil moisture.

Some plants are more affected by aluminium than others:

Aluminium tolerance	Species
Highly sensitive	lucerne, barley
Sensitive	phalaris, canola, wheat
Tolerant	sub. clover, white clover, ryegrass, fescue
Highly tolerant	cocksfoot, oats, triticale, lupins

Aluminium is measured in 3 ways. 1. Aluminium (mg/kg) using a potassium chloride extractant (Al mg/kg KCl), 2. Aluminium using a calcium chloride extractant (Al mg/kg CaCl₂), 3. Aluminium as a percentage of cation exchange capacity (Al ex%).

The following table summarises the critical concentrations of aluminium that will cause a reduction in plant yield:

Aluminium tolerance of plants	Aluminium mg/kg KCl	Aluminium CaCl ₂	Aluminium ex% low salt (0.07 dS/m)	Aluminium ex% medium (0.07-0.23)	Aluminium ex% high (>0.23)
Highly sensitive	15-30	0.5-2	9-16	2-8	0.5-2
Sensitive	30-50	2-4	16-21	8-12	2-6
Tolerant	50-100	4-8	21-32	12-21	6-10
Highly tolerant	>100	8-13.5	32-43	21-30	10-16

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