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Aluminium in Plant Nutrition

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The metal aluminium is one of the relatively abundant element in the earths' crust and as such it is a constituent of almost all soils Inspite of its abundance, its essentiality for plant growth is still no definite, although its presence has been observed in minute quantities in most plants.

It exists in all flowering plants, in widely varying amounts, from 6 mg. per kgm. of dry matter in sugar beet, upto 1640 mg. per kgm, in beans. Grains and seeds as a rule are very low in Aluminium - content Green leafy vegetables ordinarily contain the highest proportion of Aluminium. It accumulates more rapidly during early growth than later more abundantly in the leaves than elsewhere and particularly so in the greenest leaves than in pale or etiolated ones. Fleshy succulent fruits have usually a medium content of Aluminium., but strawberries seem to be an exception as they are relatively rich in this metal. Edible roots have less than ordinary roots. Bulbs and tubers have a medium Aluminium., content, but the onion bulb is especially rich as in other metals.

One curious feature is that *xerophytes* are as rich in Aluminium as *hydropvytes*. Among the *Pteridophytes* in the ferns like *Aspidium* and *Polypodium*, Aluminium deficient plants were found to be more sensitive to frost. In *Lycopodiums* several species are found to behave as Aluminium accumulators as also one or two species of *Euphorbiaceae*. The *Pecan* nut is another accumulator of Aluminium.

Being an amphoteric element, it is not surprising to find that Aluminium in soluble form is found in large amounts in soils that are strongly acidic as well as in strongly alkaline soils.

The first evidence of Aluminium toxicity is dwarfing of the plants and injury to the roots. Plants accumulate Aluminium, in the cortex, mainly in the protoplasm, with a concentration of it in the nuclei.

In the case of rice, toxic symptoms begin to develop in the concentrations of 1/7500 N. and above of Aluminium chloride. In sugarcane, too much Aluminium in the soil is believed to be one of the factors involved in the low fertility of some Hawaiian soils.

Soil phosphates, in concentrations equivalent to that of Aluminium are able to neutralise completely the toxicity of an excess of Aluminium compounds in the soil. Liberal dressings of organic matter are also helpful in counteracting the effects of Aluminium, upon sensitive crops.

One of the most interesting features of Aluminium, nutrition, is its ability to change the colour of flowers from pink into blue. Thus in *Hydrangeas*, pink flowers can be changed to blue by spraying them with a 2·5% solution of aluminium sulphate. When the buds are sprayed repeatedly (five times) with aluminium sulphate, it is possible to secure blooms of uniform blue. The injection of Aluminium, sulphate into the stems of normally pink-flowered *Hydrangea* plants also influences the colour and if a fairly deep cut is made near the base, it is possible to obtain completely blue umbels.

In the cultivation of *Cyperus malaccensis* which is grown in Japan for making nets, application of Aluminium sulphate to the soil had a distinctly favourable effect upon the growth, yield and quality of fibre. Other workers have also reported improved growth in a few other crops by supplying small amounts of Aluminium salts to the soil, but considering the narrow margin that exists between optimum and toxic levels: this is not a practice that can be advocated for general adoption.

Research Note

A Note on Paddy Straw Treatment for Improvement of Feeding Quality

The quality of paddy straw as a feed could be increased in two ways. One by improving its feeding value as assessed by increased calorific value of the straw and the other by reducing the high contents of certain substances like potassium and oxalates which are present in deleteriously high amounts in the paddy straw. Work done at the Veterinary Research Institute, Izatnagar (3) and at the Agricultural Research Institute, Coimbatore (2) had indicated that the quality of straw as a feed could be increased in both the counts mentioned above by the alkali treatment (i.e. straw treated with 8 times its weight of 1·25% alkali). It has recently been indicated (1) that mere water washing of the paddy straw improves its quality as a feed.

In order to get definite data on this point, a small quantity of paddy straw was soaked with 8 times its weight of distilled water and left overnight. It was subsequently washed, dried and taken up for analysis with the original untreated sample.