NITROGEN INDUCED ZINC AND COPPER DEFICIENCY
Is this a problem for you ?

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What's in this Insight

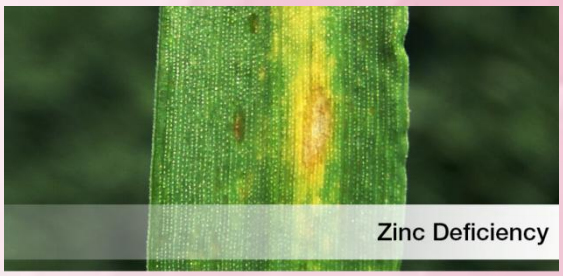
This IN explores the proposition of nitrogen induced zinc and copper deficiency and how the careful monitoring of fertiliser routines is required to ensure the correct balance of trace elements is maintained to bring about successful crop outcomes.

Overview

It has been acknowledged for many years now that nitrogen is fundamental to the success of a crop.

Back in 1970 the Australian Journal of Agricultural Research published a paper that suggested that *"nitrogen fertilisers induced deficiencies of both zinc and copper in wheat plants by stimulating plant growth to such an extent that the absorbed zinc and copper was diluted to deficient concentrations".*

This is an interesting proposition, that makes us think of yet another quotation that says *"nitrogen is the KING of fertilisers, but trace elements – in particular zinc and copper – are the servants that make it perform much better".*


Zinc Deficiency


Copper Deficiency

The Key role of Nitrogen

Nitrogen is an integral part of all plant proteins. So, to a large extent, the nutritive value of the food we eat is largely dependent on the availability of nitrogen to enable strong crop growth. It is required in greater quantities by crops than any other of the essential nutrients – with the exception perhaps of potassium in some high-yielding crops. Most soil nitrogen comes from organic matter, which releases nitrogen slowly, with the rate being controlled by factors such as temperature, moisture, texture and rhizosphere activity. Adequate nitrogen produces a dark green color in the leaves, caused by a high level of chlorophyll.

- **When deficiencies occur**

  When plants are deficient in nitrogen, symptoms appear firstly on older leaves as light green to yellow foliage. Symptoms then develop on younger plant parts as the condition becomes more severe. Other symptoms that may appear include stunted or spindly plants, less tillering in small grains, low protein content in seed and vegetative parts or fewer leaves. Nitrogen deficient plants will mature early, with significantly reduced yield and quality.

The Critical role of Zinc

Zinc was one of the first micro-nutrients recognised as essential for plants and is ancestrally deficient in southern hemisphere arid zones. It plays a key role in many of the plant's enzyme systems. It controls the production of important growth regulators that influence new growth and ongoing plant development. Zinc is critical for the synthesis of nucleic acids and plant hormone metabolism. It is also necessary for photosynthesis and produces increased grain quality of both weight and protein.

- **When deficiencies occur**

  One of the first indicators of zinc deficiency is the presence of stunted plants, resulting from a shortage of growth regulators. Zinc deficiency appears as a chlorosis in the inter-veinal areas of new leaves, producing a banding appearance. Leaf and plant growth become stunted with the increasing severity of the deficiency, and leaves eventually die and fall off the plant. At branch terminals of fruit and nut trees, rosetting occurs with considerable die-back of the branches. High applications and/or soil reserves of phosphorus can restrict uptake of zinc.


Healthy Plant


Deficient Plant


Healthy Plant


Deficient Plant

The Critical role of Copper

Copper is a key element component of chlorophyll and plays a central role in photosynthesis. Soil deficiencies are often associated with high organic matter soils and peats since copper is held more tightly by organic matter, thereby making it less available for root uptake. Copper is also critical for the functioning of many enzyme systems, for photosynthesis, for the manufacture of ligning (i.e. cell walls) and also produces increased grain quality.

- **When deficiencies occur**

  Copper deficiency is not as easily identified as other micro-nutrients, however as copper doesn't move in the plant readily, it appears first in younger growth. Often young growth is reduced, stunted or distorted. In trees, copper deficiency may cause white tip or bleaching of younger leaves and summer die-back.


Healthy Plant


Deficient Plant


Healthy Plant


Deficient Plant

Maintaining the right Balance

Many deficiencies and excesses can be anticipated by careful and critical analysis of soil test reports.

By maintaining the right balance of nutrients in the soil ensures that plant growth will benefit – and this means not forgetting that as the level of macro nutrients (like nitrogen) are increased, so too the balance of minor elements such as zinc and copper are attended to. This is the best outcome for any crop.

One way to achieve this, is through the use of a Seed Primer to increase nutrient levels inside the seed. The BSN range of Seed Primers (**BSN Superstrike** and **BSN Ultra**) provide a perfectly balanced nutrient package to prime and set the seed for optimum yield from the very outset.




The use of Ultra Foliar fertilisers, which are proven to be more efficient at delivering micro-nutrients, is also an advantageous way of extending a healthy and robust growing season for the crop.

Conclusion

As the world moves into an era of requiring more and more food to supply an ever increasing world population, it is imperative that farming methods and practices are scrutinised to ensure the best possible crop outcomes, and a sustainable agricultural future.

A much more thorough understanding of the nutrient levels in the soil is needed, as well as a greater practical knowledge of nutrient roles. It is important that the antagonistic and synergistic effects of chemical fertilisers upon one another is fully understood.

Something as simple as balancing nitrogen application, in tandem with the zinc and copper needs of the crop, is just one of many examples that can significantly increase crop yield and quality.

Properly balanced and applied crop nutrition is one of the most effective and economical ways of achieving many of its important crop protection needs.