BMS
MICRO-NUTRIENTS
CHELATED MICRO-NUTRIENTS & FOLIAR FERTILIZERS

English

Cereals

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Chelal® Cu - Landamine® Cu: Technical Information

Since 1979 **BMS Micro-Nutrients** specialised itself in plant nutrition and developed an innovative product line based on **chelated micro and meso elements**, and various complete fertilisers all developed especially for the **foliar nutrition** of all type of crops. Over the years a lot of experience was obtained on almost all commercially grown crops, including all cereals, and this under a wide range of circumstances, soil and climatological conditions.

Technical support is guaranteed by a technical staff with broad experiences in the field, not only in Europe (France, Italy, Spain, Portugal, Belgium, The Netherland, Germany), but also in Brazil, the Russian Federation, USA, New-Zeeland, Mexico,... Self-initiated research and in cooperation with several research institutes and official agencies led to promising developments in the field of plant nutrition.

BMS Micro-Nutrients' department of research and development dedicated various programs on cereals. This research showed clearly that these crops, and in particular wheat, are very sensitive to Copper deficiency. Copper is an essential element in the nutrition of cereals. Another important result of this research is that this element does not only increase production in kg/ha but it also improves the quality of the yield. In this document we present to you, 2 products which are the result of these research programs:

Landamine® Cu and Chelal® Cu

The role of copper

To assure that the life cycle of the cereals develops normally and completely, these crops don't only need the mayor elements (nitrogen, phosphorous, potassium, calcium, magnesium and sulphur) applied with the traditional soil fertilization, but also the micro-nutrients (copper, manganese, zinc, iron, molybdenum and boron) are of upmost importance. These micro-nutrients participate in almost all essential functions within the plant, because they intervene and make most enzymatic reaction in the plant possible.

For cereals the element **COPPER** is in particular very important. Copper intervenes in various essential functions:

- Stabilizes the chlorophyll and increases the number of chloroplasts, stimulating thus the photosynthesis.
- Stimulates de seed production.
- Facilitates the assimilation and translocation of nitrogen within the plant.
- Intervenes in the formation of cell walls.
- Strengthens cell membranes (increased physical resistance).
- Intervenes in the synthesis of lignin.
- Forms part of the poly-phenol oxidase which increases the auto defence mechanisms of the plant.
- Stimulates seed germination and early growth.
- Is very important for the fertility of plants (Cu-deficiency causes sterile ears in cereals = empty or half empty ears).
- Increases the specific weight of the grains.
- Reduces the aging process.
- Improves the resistance to flattening of cereals.

COPPER IS INDISPENSABLE FOR THE CEREALS

COPPER

- Increases the YIELD
- Improves the QUALITY of the YIELD
- Assures an optimal FUNCTIONING of the plant

COPPER
Deficiencies

The consequences

- Drying up of the ends of the young leaves, which become brittle. Rolling or curling of the young leaves into a cone/corkscrew shape (white flag/tip disease).
- Loss of leaf surface.
- Growth reduction:
  - The ears fail to emerge from the last leaf.
  - The ears can't develop correctly.
  - Drying and dead flowers at the tip of the ears.
  - Empty and sterile ears - aborted grains.
  - Small and shrivelled grains.
- Considerable reduction in yield.

Visual symptoms

- **YES:** when the copper deficiency is very pronounced.
- **NO:** when it is a sub-deficiency (most frequent case).

In any case, when the visual symptoms appear on the crop, it is already too late to intervene still.

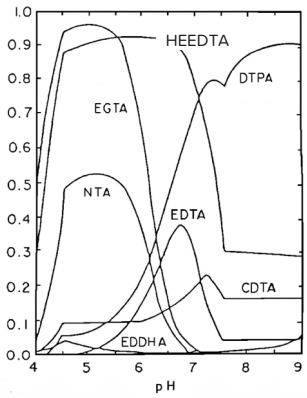
THE KILOS LOST CAN NEVER BE RECOVERED AGAIN

Risk situations

- Soils poor in copper.
- Slightly acid soils.
- Calcareous soils.
- After heavy liming.
- Excess of organic material.
- Excess of nitrogen and or potassium.

SOLUTIONS
Chelal® Cu and Landamine® Cu

The efficiency of our Copper chelates



The mixture of chelating agents EDTA, DTPA and HEEDTA assure a high stability and maximal availability of the Copper, independently of the pH of the soil or the leaf. Landamine® Cu and Chelal® Cu contain these 3 chelating agents for maximal stability.

Chelal® Cu: Water-soluble copper (Cu): 7,6 % (= +/- 100 g Cu/L); Total copper (Cu) chelated by authorised chelating agents (EDTA, DTPA, HEDTA): 7,6 % (= +/- 100 g Cu/L)

Landamine® Cu (0-21-24): 21 % total phosphorus pentoxide (P_2O_5)(= 9,1 % P); 21 % phosphorus pentoxide (P_2O_5) soluble in water and in neutral ammonium citrate (= 9,1 % P); 24 % potassium oxide (K_2O)(= 20 % K), water soluble; 1,3 % copper (Cu), as chelate (DTPA, EDTA, HEEDTA) water soluble of which chelated by DTPA 0,05%, chelated by EDTA 1,2%, chelated by HEEDTA 0,05%; poor in chloride.

Your security with BMS MN products

LANDAMINE® Cu and CHELAL® Cu contain chelated copper:

- The copper is completely plant available and easily assimilated by the plant.
- The copper is active in the plant on all the sites where the element intervenes.
- The copper is not leachable.

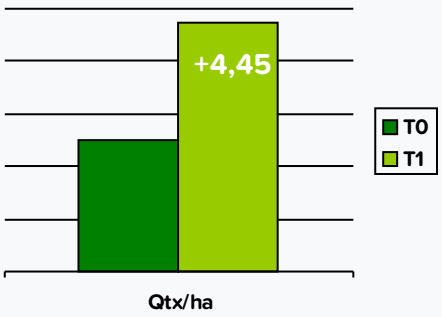
LANDAMINE® Cu and CHELAL® Cu are not toxic for the cereals, nor for the crops following later in the rotation.

Easy to use products

- Are liquids, which make them easy to use.
- Can be used as well foliar as to the soil.
- Adapt themselves to all types of soils.
- The products can be used from sowing until end of tillering.
- Are compatible with most of the pesticides used in cereals (please consult always first our mixability list, available on the website: www.chelal.com).

Trials

CHELAL® Cu and LANDAMINE® Cu have been tested in various grain producing areas in France, Belgium and Italy. Various hundreds of trials and field demonstrations, allowed us to evaluate the advantages of the products CHELAL® Cu and LANDAMINE® Cu. Also official trials in collaboration with specialised organisations (I.T.C.F., E.N.S.A.T., S.U.A.D.,...) have proven the efficiency of these chelated BMS Micro-Nutrients formulations. At the recommended dosages of CHELAL® Cu and LANDAMINE® Cu an average increase in yield of 445 kg/ha has been obtained over the years.



APPLICATION
Landamine Cu - Chelal® Cu

Moment of application

Recommended treatment in autumn | **Possible treatment in spring**

It is important to apply copper before the end of tillering. It is exactly during this period, from sowing until end of tillering, that the consumption of copper by the plant reaches its maximum, ending it influence after this moment. This is the reason why the products CHELAL® Cu or LANDAMINE® Cu are recommended in the beginning of the season, and not afterwards because it could even have a depressive effect at late stages.

If possible, early treatments are recommended, during autumn (from the sowing until plants with 3 leaves), in order to assure that the copper applied by CHELAL® Cu or LANDAMINE® Cu is plant available before and during the stages of maximal need of this element. This way an optimal juvenile development of the crop is assured and the plants will have an increased resistance to possible adverse climatological conditions during the winter.

LANDAMINE® Cu contains also potassium and phosphorous. Applied in combination with nitrogen fertilizers, the cereals have a complete nutrition of all the elements that determine the productivity. Phosphorous also improves the root formation and will have therefore a STARTER effect.

CONCLUSIONS

Chelal® Cu and Landamine® Cu are formulations that perfectly meet the needs of farmers who want to progress, and optimize the performances of their cereal crops.

Respecting some simple rules, Chelal® Cu and Landamine® Cu will ensure the correct copper nutrition of all kinds of cereals, what subsequently will increase the productivity and the quality of the yield.

Chelal® Cu and Landamine® Cu can easily be integrated in a program of optimized nutrition.

It is also ecological "common sense" to apply the products Chelal® Cu or Landamine® Cu. Chelal® Cu is allowed in the ecological production, and both products are very efficient allowing a reduction of the total amount of copper applied. They also increases the efficiency of other fertilizers applied.

Control | with Chelal® Cu

Control | Chelal® Cu 2 L/ha

Application

How to apply the products?

As well **Chelal® Cu** as **Landamine® Cu** can be applied to the soils as foliar. The products can be applied with all currently used sprayers as long as a homogeneous distribution of the solution is guaranteed over the whole field.

Chelal® Cu and **Landamine® Cu** are compatible with most pesticides used in cereals, avoiding therefore supplementary applications and the cost related to it. Often they are applied together with the herbicides or the nitrogen applications.

Dosage of the products

Chelal® Cu: 1,5 - 2,0 L/ha.
Landamine® Cu: 2 - 6 L/ha.

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