

## INFLUENCE OF COPPER IN A CHELATE COMPLEX WITH GLYCINE

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One and the same plant assimilates from the soil the more microelements, the higher their mobility. In this regard, it becomes necessary to create such conditions that the microelements are kept in a mobile state as long as possible. That is why the development of microfertilizers requires the creation of stable and water-soluble compounds, which include chelate compounds. The type of chelating agent significantly affects the efficiency of fertilization and the degree of absorption of trace elements by the plant. So, chelates based on lignins are absorbed 4 times better, based on citrates – 6 times, and based on classical chelating agents (EDTA, OEDP, DTPA) – 8–10 times better than traditional fertilizers [1]. The need to choose the most effective chelating agent, as well as its concentration, determined the relevance of our work.

Ligands containing two or more atoms capable of forming a bond with metal ions create complexes that are highly stable. The latter are called chelate or chelated, as well as intra- complex or cyclic complex compounds. Compounds of this type play a very important role in biochemical processes. Copper glycinate belongs to chelated complex compounds [2].

The aim of the study is to determine the effectiveness of copper glycinate in various concentrations.

**Material and methods.** Copper sulfate ( $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ ), glycine, sodium hydroxide, distilled water, ice, seeds (watercress), river sand were used for the work.

Synthesis of glycine copper salt. To a solution of 5 g of glycine in 35 ml of water was added 2.64 g (0.066 mol) of sodium hydroxide over 10 minutes and heated to 60 ° C. 8.2 g (0.033 mol) of copper (II) sulfate was sprinkled into the homogeneous solution in small portions  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  with stirring and kept for 20 minutes at a temperature of 50 ° C. The reaction mixture was cooled to 7-10 ° C, the precipitated crystalline product was filtered [3].

Experience number 1. The seeds were soaked in a diluted solution of copper glycinate for 1 hour, sand was cleaned with 200 g, 50 seeds were sown on each vessel, fertilized with a dilute solution prepared in 100 ml of purified water with the addition of 1 g of copper glycinate every 4 days, purified water served as a control.

Experience number 2. The seeds were soaked in purified water for 1 hour, 100 seeds were sown on 250 g of sand, fertilized with a dilute solution prepared

for 100 ml of purified water with 0.1 g of copper glycinate, purified water served as a control, fertilized every 4 days.

**Results and its discussion.** The results of the experiments are reflected in tables 1 and 2.

Table 1 – Experience No. 1.

Number of seeds	Fertilizer	4th day PCS./ %	Day 8 PCS./ %	12 day PCS./ %	Day 15 PCS./ %
150 seeds 3 control	Copper glycinate 1g (100ml H <sub>2</sub> O) (conc: 0.01%)	4 pieces of seeds 2.66%	70 pieces of seeds 46.66%	106 seeds 70.66%	121 seeds 80.66%
50 seeds 1 control	Control (H <sub>2</sub> O)	33 seeds 66%	40 seeds 80%	44 pieces of seeds 88%	49 seeds 98%

Table 2 – Experience No. 2.

Number of seeds	Fertilizer	4th day PCS./ %	Day 8 PCS./ %	12 day PCS./ %	Day 15 PCS./ %
200 seeds 2 control	Copper glycinate 0.1g (100ml H <sub>2</sub> O) (conc: 0.001%)	80 seeds 40%	86 seeds 43%	91 seeds 45.5%	94 seeds 47%
100 seeds 1 control	Control (H <sub>2</sub> O)	30 seeds thirty%	35 seeds 35%	41 seeds 41%	43 seeds 43%

According to the results of experiment No. 1, 121 (80.66%) pieces of watercress seeds germinated out of 150 seeds, 49 (98%) pieces of watercress seeds were known from the control.

According to the results of experiment No. 2, out of 200 pieces of seeds, 94 (47%) pieces of watercress seeds germinated; according to control, 43 (43%) pieces of watercress seeds were known.

**Conclusion.** Based on the data obtained as a result of counting germinated seeds, the following conclusion can be drawn. Seeds soaked in a diluted solution of copper glycinate and fertilizer with a concentration of 0.01% (experiment No. 1) showed a higher percentage of germination than seeds soaked in purified water and fertilizers with a concentration of 0.001% (experiment No. 2). This indicates that fertilizer with a concentration of 0.01% (experiment No. 1) was better absorbed by the plant and had a good effect on the growth and number of watercress.

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