Influence Newly Syntesized Manganese Complexes with Amino Asids on Morphophysiological Chracteristics Wheat Germ

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Summary

Complex compounds of manganese with the amino acids glycine, cysteine and methionine were synthesized. The impact of these complexes on growth, development of seedlings and chlorophyll content was studied. Manganese complex with cysteine had a positive effect on seed germination of wheat. Seedlings treated with this complex contained more chlorophyll and were resistant to drought.

Keywords: Triticum durum, germination, manganese, amino acids, chlorophyll, drought

Introduction

It is known that the microelements have a positive effect on transport of substances and activity of enzymes, on the quantity and quality of the yield, drought resistance, and increase the tolerance of plants to disease (1-3). High demand of cereals for micronutrient observed at different stages of development: in the germination stage of seeds, in connection with the activation of microelements involved in the hydrolysis of reserve substances; in the phase of bushing, due to the formation of lateral shoots and adventitious roots from underground stem nodes; in the stem elongation phase, due to long internodes and active growth processes. At this stage of development of the plant is actively used photosynthetic active solar radiation and the active role of micro elements is shown in the synthesis of chlorophyll and other pigments photosynthesis (4, 5, 7-10). When applying micronutrients in the form of soluble salts, most of them absorbed by soil particles and becomes inaccessible to the root systems of plants. Thus, an effective method of introducing the microelements is their application in the form of chelating complexes and feeding plants with such complexes. The advantage of chelating micronutrients lies in the fact that they are more easily assimilated by plants and efficiently, but it should be noted that they effect as xenobiotics and their decomposition produces toxic substances to plants. Currently, work is underway to create a complex biogenic metals with useful organic acids involved in the metabolism of plants.

The aim of this work is synthesis of complexes amino acids- manganese, study their effect on germination, growth and development of seedlings, on chlorophyll content in leaves of wheat.

Material and Methods

Synthesis of manganese complexes of amino acid was performed at 50 ° C by adding to solution of manganese sulfate the solutions of amino acids (cysteine, methionine, glycine) with stirring and further crystallization (6).

The objects of the study were the seeds of durum wheat (Triticum durum L.).

Wheat seeds soaked in the solution of the complex within 24 hours. Control seed were soaked with water. Control and experimental seeds germinated on filter paper in Petri dishes at 20 ° C incubation conditions. Germination rate and energy of germination were determined. The chlorophyll content was determined on the spectrophotometer at a wavelength of 663 and 645 nm. As the solvent was used 80% acetone.

Results and Discussion

The germination energy and germination of seeds treated with manganese complex with amino acids identified in the three-day and seven-day seedlings, respectively (Table 1). As seen from Table 1, the seeds treated with cysteine - manganese complex have high germination and germination energy.

The stimulating effect of low concentrations of manganese sulfate solution on germination energy, germination and seedling growth was noted by several authors (11-14). In these studies indicated that low concentrations of manganese sulfate has a positive effect on the synthesis of chlorophyll and carotenoids, increased functional activity of chloroplasts.

In table 2 shows the data to determine the content of chlorophyll in leaves of wheat seedlings. As can be seen from the table, the $MnSO_4$- cysteine complex had a positive effect on the chlorophyll content, as well as the ratio of Chl a / Chl b.

Table1: Effect of Complex MnSO4 - Amino Acids on the Germination Energy and Germination of wheat

Properties	Age seedlings,days	Variants				
		Control (H_2O)	$MnSO_4$	$MnSO_4$-cysteine	$MnSO_4$-methionine	$MnSO_4$-glycine
Energy of germination, %	3	30	29	33	32	31
Germination, %	7	65	63	67	67	66

Some researchers showed that at high concentrations of manganese, zinc, phosphorus and iron in the medium it is difficult zinc absorption by the root system of plants. However, the low concentrations of manganese, zinc and phosphorus enhance the growth and development of plants, increases the chlorophyll content in the leaves. It was concluded that the low concentrations of these elements provide the normal development of wheat plants.

In our experiments, 10-day-old seedlings of wheat exposed to water stress. After a one-week period of drought began to pour water and followed the release of plants from stress situation. The output of the plant stress state was the following sequence: MnSO4- cysteine, MnSO4- methionine, MnSO4- glycine and control.

Table 2: Influence of MnSO4 - Amino acid Complex on the Chlorophyll Content in Leaves of Wheat Seedlings (mg / l)

Variants	Xl a+b	Xl a/b
Control (H_2O)	6.75±0.2	2.5
$MnSO_4$-cysteine	8.95±0.2	3.2
$MnSO_4$-methyonine	7.25±0.3	2.7
$MnSO_4$-glycine	4.92±0.1	1.9

Thus, on the basis of these data we can conclude that the manganese complex with cysteine has a positive impact on growth and development of wheat seedlings and increase their drought resistance.

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