

Original Research Article

Analysis of the performance of seeds of *Capsicum frutescens* placed to germinate in substrate treated with different doses of micronutrientes

1. Abstract

The use of chilli pepper (*Capsicum frutescens*) in cooking is common, however, the increase in the use of family farming also as a defensive, has led, in the coastal region of Alagoas, to an increase in the cultivation of this condiment, both on the north coast and on the southern coast of the state. In the latter, the cultivation by the small producers is so intense that the local cooperative has embraced the initiative and assumed the responsibility of transferring all production of such raw material to a processing plant located in the neighboring state. With such influence and increased production, he began to perceive some seed issues that could hinder his production in the field, such as fungus susceptibility and lack of some essential micronutrients due to nutrient poverty on the Alagoan coast. In observing this, the commercialization companies already treat the seeds with fungicides, however, the lack of nutrition still needs to be overcome. An alternative is treatment of the substrate with micronutrients, which in this assay has proven effective in meeting such need.

Index terms: Chilli pepper, Micronutrients in seeds, Seed treatment, Zinc.

2. Introduction





The need for more vigorous commercial plantings has made fertilizer improvement research a vast and at the same time repetitive subject with comparisons and doses of certain assets found in rural areas.

The lack of economic and efficient options has led small farmers to get into debt by trying to compete in a disloyal and struggling market that is growing and devastating those who do not adapt to it.

Thinking about it, researchers around the world have mobilized to economically and affordably try to bring inexpensive options to those who can not afford genetically modified products so that they can adapt to cultural management simply by incrementing, in a simple way, some product that will improve the performance of your harvest.

According to BRASIL et al., 1999, plants have specific nutrient needs, requiring the supply in the right quantity and in the proper form. Framed in this way, are also the micronutrients that are little perceived, but their absence is quite noticed.

Within this context, we find chilli pepper, which has been growing in commercial interest within the state of Alagoas, replacing large areas where sugar cane monoculture was once imperative, uniting small producers in favor of a change not only of paradigms, but of life.

The initial proposal is to insert a micronutrient at the moment of transplantation of the seedling into the pit that reduces the susceptibility of the plant to attack of pathogens and that participates in processes essential in the metabolisms of the plant. According to KIRKBY and RÖMHELD (2007), there is increasing evidence that Zn, by maintaining the structure and integrity of the membrane and controlling permeability, also protects the plant from various pathogens. In plants deficient in this

micronutrient, the membranes become permeable, such that carbohydrates and amino acids are released, attracting pathogens and insects to both roots and shoots.

Zinco is also required for generative growth and the viability of pollen is highly dependent on an adequate supply of this nutrient (SHARMA et al., 1990). It is deduced that the lack of this micronutrient can make all the difference between the exit from the vegetative state to the reproductive to the adult plant.

An experiment conducted by VIÉGAS et al (2013), showed that in the long pepper the lack of some nutrients, including Zinco, promote the occurrence of visual symptoms of deficiency accompanied by reduction in the foliar content of their respective nutrients. This reduces the ability of photosynthesis, which can be fatal to the plant.

The choice of treatment of the substrate rather than the seed contributes to the absence of reaction of the chemical compounds found in the seeds treated with fungicide.

3. Materials and Methods

The tests were carried out at the Plant Propagation Laboratory of the Department of Plant Production at the Agricultural Sciences Center of the Federal University of Alagoas (UFAL) located at 9° 29' 45"South Latitude and 35° 49' 54" . Two lots of chilli pepper seeds (*C. frutescens* L.) and three treatments besides the control were used.

Four replicates of four pre-tests were carried out with two different batches of chilli pepper to arrive at the best dosage to be applied in the official tests.

Two untreated seed lots were used for each substrate.

Four replicates were performed for each batch of each treatment.

The substrate used was treated blotting paper, placed in gerbox-type boxes, submitted to alternating temperature 20° - 30° C and 8 hours light, controlled in a BOD (Biochemical Oxygen Demand) type incubator. The 32 gerboxes were identified following this model: Lot 1: Treatment 1: Repetition 1 = 1.1.1. The control was identified as Treatment 4. According to:

- Treatment 1: 12 hours submerged in 1 ml solution of pure zinc with 52 ml of distilled water;
- Treatment 2: 12 hours submerged in 1 ml solution of Zinc + Molibdenium with 52 ml of distilled water;
- Treatment 3: 12 hours submerged in 1 ml solution of Zinc + Molybdenum + Copper with 52 ml of distilled water
- Treatment 4 (Witness or Control): 12 hours submerged in distilled water.

The first count was made at 7 days and the last count at 14 days, as taught by RAS, to record the IVG, according to the methodology described: Germination speed index - daily counts of seedlings emerged up to 14 days after sowing, and IVG was calculated according to Maguire's formula (1962):

$$IVG = \frac{G_1}{N_1} + \frac{G_2}{N_2} + \dots + \frac{G_n}{N_n}$$

On what:

G1, G2, Gn: number of seeds germinated in the first, second, until the last count;

N1, N2, Nn: Number of days after sowing in the first, second, until the last day;

4. Results and Discussion

The first count was done seven days after the germination test, as explained in the RAS (Rules for Seed Analysis). It was observed in Figure 1 that treatments 2 and 3 were not as good as the control, however, treatment 1 exceeded the expectation, demonstrating that the application of this micronutrient to the pit, in the form of direct fertilization, during the transplant period, can supply the initial need for molting, making it more vigorous and increasing the vigor of this seed by up to 38% in relation to no treatment

In Figure 2, where we can see the final count of the germination speed test, although the treatment 1 was always highlighted and showing a better vigor, the germination rate in the final count was the same for the treatment with pure zinc with zinc + molybdenum + copper and the control (or control). It is also observed that the treatment with Zinc and Molybdenum did not obtain any response to the chilli pepper culture when applied to the substrate.

When applying the Tukey test at 5% propolis, by the SISVAR program, the high vigor that Zinc provides in the planted seeds is observed, differentiating, statistically, both the treatment 3 and the control. Treatment 2, which consists of zn + mo, did not respond, demonstrating that this treatment, applied to the substrate at the time of planting the chile pepper seed should not be used as it slows the germination or makes the seed unfeasible.

Based on this experiment, we can also say that the small farmer can be considered in a positive way, since the essential micronutrient "zinc" is not expensive and, when applied at the time of transplant, reduces costs.

Adding zinc to the fertilization of your planting at the time of sowing is an inexpensive and interesting alternative that will be able to force your garden and, after the harvest, you can incorporate these plants to the soil, providing more nutrients. Considering what some authors have published in other articles, the application of zinc reduces the susceptibility of seeds or seedlings to the entry of pathogens and also increases the likelihood of uniformity in reproductive capacity.

The use of Zinc in the substrate at the time of sowing of the chilli pepper or in the pit at the moment of the transplant of the seedlings of this pepper, increases the speed of the germination, making the seedling more vigorous and without losses in the quality.

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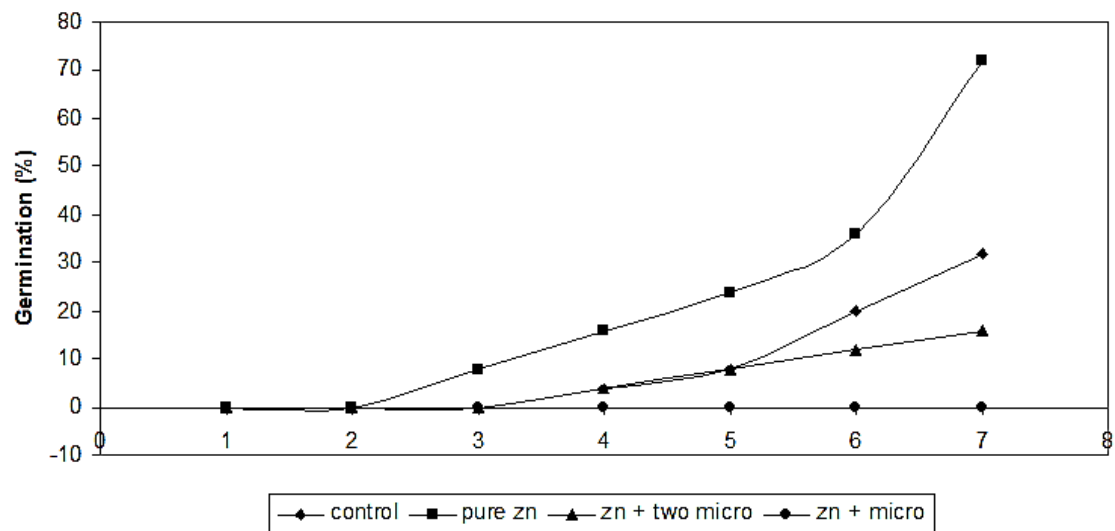
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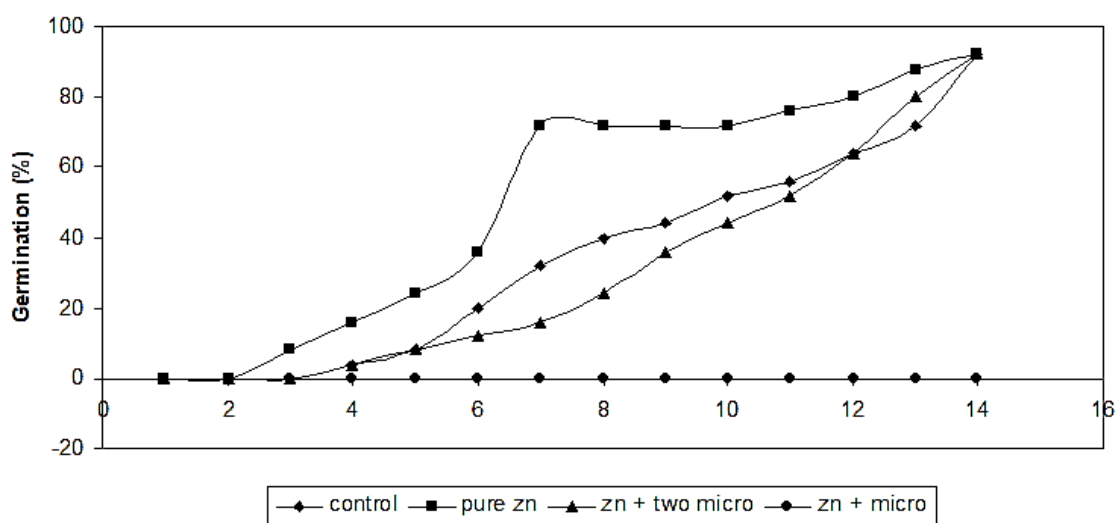
6. Figures

Figure 1: First count of the germination speed index



The treatment with zinc surpassed the control

Figure 2: Germination Speed Index and final count



At the end of the fourteen days it can be seen that the percentage of germination was the same, although the treatment of pure zinc stood out during the whole process of germination speed, demonstrating greater vigor in relation to the other treatments.

Figure 3: Varian Analysis Table

Variável analisada: F.C.



FV	GL	SQ	QM	Fc	Pr>Fc
Nl	3	2864.000000	954.666667	1.0E+0009	0.0000
erro	0	0.000000000E+0000	0.000000000E+0000		
Total corrigido	3	2864.000000			
CV (%) =	0.00				
Média geral:	30.0000000	Número de observações:		4	
Média harmonica do número de repetições (r): 1					
Erro padrão: 0					
Tratamentos	Médias		Resultados do teste		
zn + micro	0.000000		a1		
zn + two micro	16.000000		a2		
control	32.000000		a3		
pure zn	72.000000		a4		

Statistical analysis of the tuckey test at 5% probability, in relation to the first count