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EFFECTS OF ZINC ON THE DEVELOPMENT OF THE PISTIL, STAMENS AND POLLEN GRAINS AND GROWTH OF BEAN PLANTS (PHASEOLUS VULGARIS L.)

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Abstract:- Environmental pollution has become one of the great challenge of human being recently. Heavy metals are one of the dangerous materials that their concentrations were increased considerably in the environment due to industrial activities. In terms of usage, among heavy metals, zinc has the fourth place in the world. The present research attempted to study toxicity of different concentration of Zn on the developmental stages of pollen grains and ovules in bean plants and also evaluation of growth factors in the Zn-treated plants. Seeds of bean plants were cultured under controlled conditions and treated with different concentrations of zinc nitrate (0, 300, 750, 1500, 3000 mg/L). Some growth characteristics such as chlorophyll content, dry and wet weight of aerial organs and so on were compared in the experimental and Zn-treated plants. For developmental stueies, young buds and flowers were harvested in different size, fixed in FAA, and prepared using cyto-hystological methods. The specimens were sliced with a rotary microtome and stained by haematoxylin and eosin. In developmental studies, the most effective concentration were also 3000, and 1500 mg/L. In the Zn-treated plants, the shape of embryo sac was changed and its size was decreased. Formation of irregular nuclei in the embryo sac is one of the most important effect of Zn treatment. The shape of pollen grains and microspore tetrads were changed considerably in Zn-treated plants. Abnormal and infertile pollen grains were increased in the treated plants in comparison with control ones. Formation of pollen grains with thin wall and large size were seen. Pollen grains, in plant under treatment, are vacoulized, and dark particles were observed in the pollen grains. Stability of tetrad layer and deficiency of transformation of nutrients from the cells to microspores can cause to abnormalities in their normal development.Results show that in growth characters, chlorophyll content, dry and wet weight of aerial organs and also most performance components of beans plants were increased by increasing of concentration of zinc from zero to 750 mg/L, significantly and then decreased in the higher concentrations. The maximum level of physiologic characteristics that are considered in this experiment, are seen in concentration on 750 mg/L and minimum of them are seen in concentration of 3000 mg/L.

Keywords:zinc Nitrate, development, ovule, pollen, physiology, bean.

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INTRODUCTION

Life and environmental pollution can be defined as an increase in harmful substances. The maximum amount of pollution generated by human activity. Each year, over 3 million tons of toxic chemicals US firms to land, air and water are added, but only some of these factories are polluting the environment. Other human activities such as agriculture, mining and the environment are also causing pollution. Here are the vast amount of environmental contamination by human and realized the importance of the threat to human life. The emissions of heavy metals in the environment play an important role and therefore arable land due to the practical use of fertilizers and chemical pesticides are more susceptible to infection. One of the heavy metals in the air and on the ground metal. Low concentrations of the metal elements and micronutrients required for plant growth is Zinc. By unwise human activities the concentration of this metal in the environment and in living organisms have increased and causes a deterrent to growth. After iron, zinc, aluminum and copper metal used in the world's fourth largest. On the use of galvanized steel and various alloys of steel can be noted. The toxicity of zinc in agricultural soils irrigated with wastewater, the indiscriminate use of fertilizers, air pollution and mining of metallurgical activity occurs (Chaney 1993). In this study, try using different amounts of zinc nitrate and add it to the soil, So toxicity and the concentrations of these substances on some physiological characteristics and genetic on a bean plant investigated.

METHOD OF RESEARCH

Bean seed (Phaseolus vulgaris) type Sayyad was taken at the Borujerd Research Center. The seeds were grown in pots under identical conditions in separate groups. Irrigated with tap water for two days was done from day thirtieth then every 2 days (because if the use of nitrate on early plant growth possible plant death due to toxicity of this substance is present) concentrations (zero, 3000,1500,750,300) mg L nitrate in the irrigation treatments were used.

The preparation of the specimens were stained before microscopic examination. Samples of the solutions were passed through absolute alcohol and toluene. Examples of pure toluene liquid paraffin at 62 ° C were transferred to an incubator. Once the tissues were completely saturated with liquid paraffin, were ready for molding. Plastic molds were used for this work. The inside of the mold with a little glycerin fat, then molds were completely melted paraffin, Samples to help warm the

paraffin pence molten paraffin incubator to come inside. Cross sections for the preparation of samples in the vertical, longitudinal sections and to prepare the participants were asleep inside the mold. To determine the length of the pod millimeter ruler and to determine fresh and dry weight and pod of precision scales were used. Spectrophotometry according to the weight of each sample was evaluated in terms of mg wet weight.

The results

Effect of treatment with zinc nitrate to plant beans in the pod as shown in Table 1, by the analysis of variance is significant ($p<0.01$), The effect of nitrate treatment on the fascia due to the significant effect of different concentrations of nitrate and so that is seen in Duncan (Fig. 1) Maximum length tunic at concentrations of 300 and lowest length were seen in levels of 3000 mg in the pod .

Table 1: (ANOVA) The fascia

	The total squares	degrees	The average	f	Significant
The group	95. 050	4	23. 762	26. 041	. 000
Within	13. 688	15	. 912		
The total	108. 738	19			

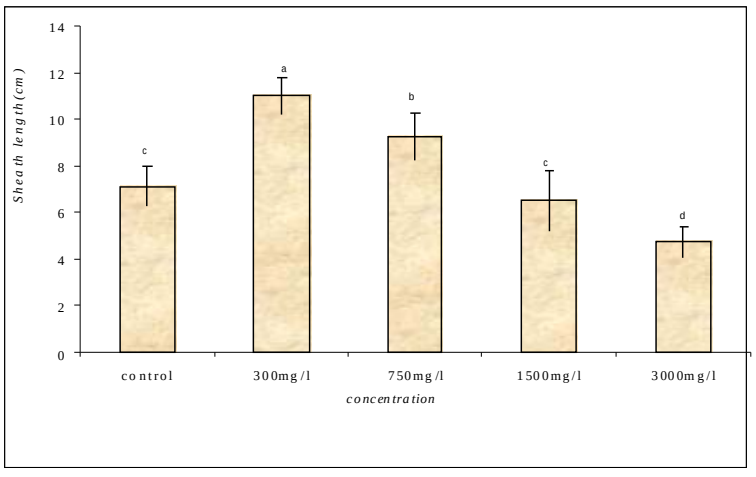

Fig. 1: The effects of density on different potassium nitrate on the pod length

The effect of nitrate treatment on fresh weight of pods per plant beans as can be seen in Table 3-2 was significant ($p<0.01$). Thus, treatment with zinc nitrate the fresh weight of pod due to the significant effects of various concentrations of nitrates and so on Duncan appears (Figure 3-2) The highest pod yield of 300 and the lowest concentration that can be seen at 3000 levels.

Table 2 : (ANOVA) weight of pods

	The total squares	degrees	The average	f	The level means
The group	402. 675	4	100. 669	187. 291	. 000
Within	8. 062	15	. 538		
The total	410. 738	19			

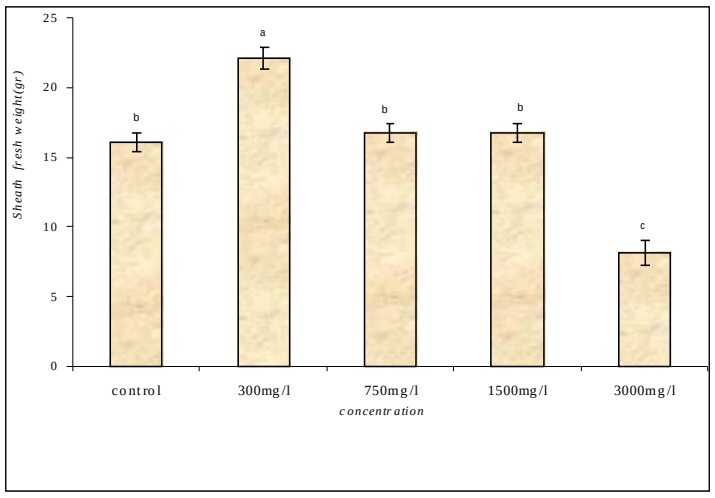

Fig. 2: effects of different density of potassium nitrate on more weight of pods

DISCUSSION

Heavy metals as environmental pollutants are a serious threat to the ecosystem. As a result of industrialization and urbanization have been developed (Baker and Brooks, 1989; Gaetke and Chow. 2003). The risk is particularly acute when the cells with excess amounts of heavy metal ions or ions vital role Ayndarnd Nutrition encounter that leads to cell damage (Hall, 2002; Avery,2001). Toxic effects of metals on plants widely in levels of biochemical, physiological, and histological processes such as photosynthesis (Gaetke and Chow, 2003; Kupper et al, 2002) secretion Pandey and Sharma, 2002)), enzymatic activity (Astolfi et al 2005), the accumulation of metals in the tissues (Pugh et al, 2002; Palmieri et al, 2005; Yousefi et al., 2011), developmental trends in sexual organs Malayeri et al, 2005; Yousefi et al., 2011)) was studied. Pollen and ovule development is crucial for the survival and reproduction, so that any abnormalities can reduction in seed production and plant hazards that threaten survival (Chehregani and Kavianpour). Microscopic studies of oocyte developmental stages of bean plant showed the same pattern of flower bud development of productive sectors described by Buvat (1989) in most dicotyledonous plants in the bean plant ovule inverted on the basis of our investigation is to report Johansson and Walles (1994) and in the beans and Chehregani who Mahanfar (2009) in some species of Onobrychis correspond and It seems to be a constant feature of all members of the family. After establishing Prymordiom egg, egg Pistachios formed that their formation is not symmetric. The development coincides with the findings of almost all oocytes Ovaries Guard (1931) and Pamplin (1963) was consistent. The stew is done in meiotic cells, leading to the formation of T-shaped tetrads are the findings of George et al (1979) is consistent. The four cells resulting from meiosis, only one of which is closer to rigid duct, remains. The remaining cells of the embryo sac and the formation of single spore type (mono Esporic) with seven grass type pattern follows the findings of Johansson and Walles (1994) was consistent. During embryo sac development, the embryo sac quad-core and eight-core vesicles formed embryo sac and embryo replacement cores are great. Finally, the cell liners and done. Lateral rigidity formed by two of the three cell polarity and asymmetric cell causing the inner hatch. Two cores in the center of the embryo sac remains core to form double and triple pole Shalazy cells (Bani), constitute dropping quickly go. Dropping rapid analysis by Carlson (1973) and Pamplin (1963) before conception and by George (1976) and Prakash et al (1979) have been reported after fertilization. Oocyte development is very important in plant survival, so that any disturbance reduces seed production and jeopardize the survival of the plant. Carpel and ovule development processes in plants treated with different concentrations of nitrate indicated on the steps of the formation, evolution and development of the ovule and embryo sac in plants which is similar to the control plants. But some differences and

abnormalities observed in treated plants. Some of these effects are common and was observed in all treatments. One of the observed effects remain small relative to controls embryo sac is The probable cause is stable stew and timely analysis Which makes solar cells can feed the embryo sac. This finding was consistent with previous findings on the effects of environmental pollutants, acid rain and particulate diesel exhaust, the eggs and embryo sac development in bean plants, Chehregani and Kavianpour, 2007).

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