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TiO_2 Nano Particles Affected on Maize (*Zea mays* L.)

Payam Moaveni [1] and Tayyebe Kheiri[2]

[1.]Islamic Azad University, Shahr-e-Qods Branch, Tehran, Iran
[2.]Islamic Azad University,Karaj Branch,Iran

Abstract. An experiment was carried out using a factorial on the basis complete randomized block design with four replications in 2010-2011 at Islamic Azad University Shahr-e-Qods Branch, Tehran, Iran. The factor of studied included of: TiO_2 Nano particles affected on maize (*Zea mays* L.). These assays were consisting of the growth stages of plant in two levels (steming stage and flowering stage). The characters were measured consist of: number of corn in plant, maize dry weight and corn yield. The results showed that the effect of TiO_2 Nano particles was significant on number of corn in plant, maize dry weight and corn yield in $P \leq 0.05$. Mean comparison showed that the highest number of corn in plant (10.10), maize dry weight (2396.35 kg/ha) and corn yield (1744.13 kg/ha) were achieved by flowering stage.

Keywords: TiO_2, Nano particles, number of corn in plant, maize dry weight, corn yield and maize.

1. Introduction

Maize *(Zea maize L.)* is one of the most important cereal crop grown principally during the summer season in i. Maize grain is used for both human consumption and poultry feed. The local production of the crop is not sufficient to meat the continuous increase of consumption (4). Mechanisms involved in Tio2-induced genotoxicity and carcinogenicity have not been clearly defined and are poorly studied in vivo.Nanoscale titania is one of the most investigated oxide materials recently owing to its important applications in environmental cleanup (9) photocatalysts (2) and solar cells (6) To increase its photocatalytic efficiency, many methods have been developed to prepare Au-coated Tio2 nanocomposites (7) For structural studies, Raman spectroscopy has recently been used to investigate heterogeneous individual and double-wall carbon nanotubes (4). Titanium dioxide (Tio2) accounts for 70% of the total production volume of pigments worldwide. It is widely used to provide whiteness and opacity to products such as paints, plastics, papers, inks, food colorants, and toothpastes. Highly ordered titania nanostructures of nanometer periodicity are very promising materials (5). Their properties depend on the size and shape of nanocrystals, as well on the type of superlattice. These structures can be obtained from titania nanodisperse hydrosols. It is necessary to prepare sols of uniform (monodisperse) nanocrystals and then to conduct sol-gel-xerogel transformations under the control of structural changes. The major goals of modern science and engineering that will have a great impact on technological applications are the efficient utilization of solar energy (1). This experiment was conducted to TiO_2 Nano particles affected on maize (*Zea mays* L.).

2. Materials and Methods

This experiment was carried out using a factorial on the basis complete randomized block design with four replications in a year planting (2010-2011) at Islamic Azad University Shahr-e-Qods Branch, Tehran, Iran. The factor of studied included of: TiO_2 Nano particles affected on maize (*Zea mays* L.). These assays were consisting of the growth stages of plant in two levels (steaming stage and flowering stage). And spraying stages with 5 levels [(control), nano TiO2,TiO2 Nano particles (0.01%, 0.02% and 0.03%, the percentage of weight 20% cloied)]. The field soiltexture was lemon-clay. The field area was 1600m in 40×40 dimension. Fertilizers were added into the field as normal suggest.

The characters were measured consist of: number of corn in plant, maize dry weight and corn yield.

3. Statistics Analysis

Data were subjected to analysis of variance (ANOVA) using Statistical Analysis System (SAS) computer software at $P < 0.05$.

4. Results and Discussion

4.1. Number of Corn in Plant

The results showed that the effect of TiO_2 Nano particles was significant on number of corn in plant in $P \leq 0.05$. The highest number of corn in plant (10.10) was achieved by flowering stage and lowest number of corn in plant (9.94) was achieved by steaming stage (Table 1, Fig 1).

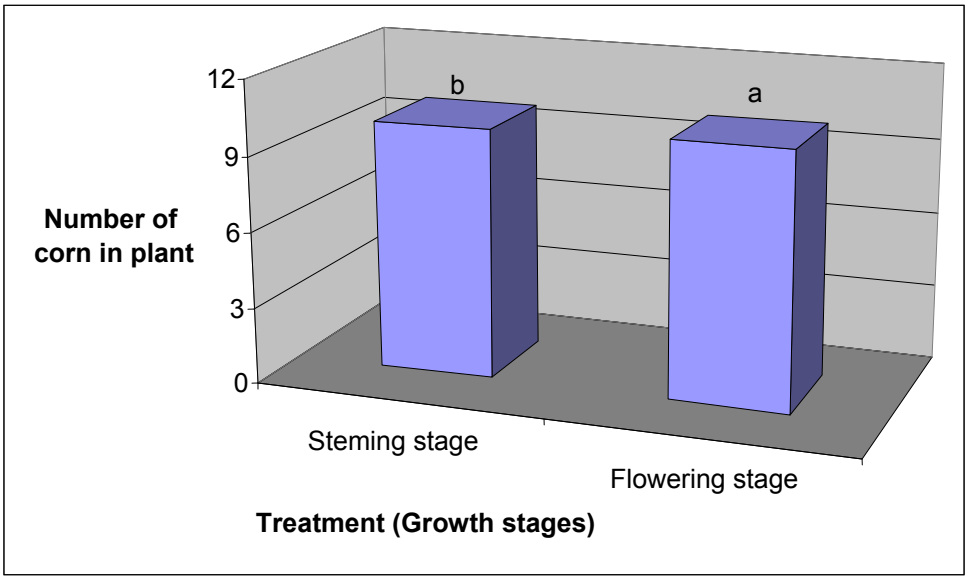

Fig. 1: Effect of Nano particles TiO_2 spraying on number of corn in plant in maize.

4.2. Maize Dry Weight

The results showed that the effect of TiO_2 Nano particles was significant on maize dry weight in $P \leq 0.05$. The highest maize dry weight (2396.35 kg/ha) was achieved by flowering stage and lowest maize dry weight (2364.38 kg/ha) was achieved by steaming stage (Table 1, Fig 2).

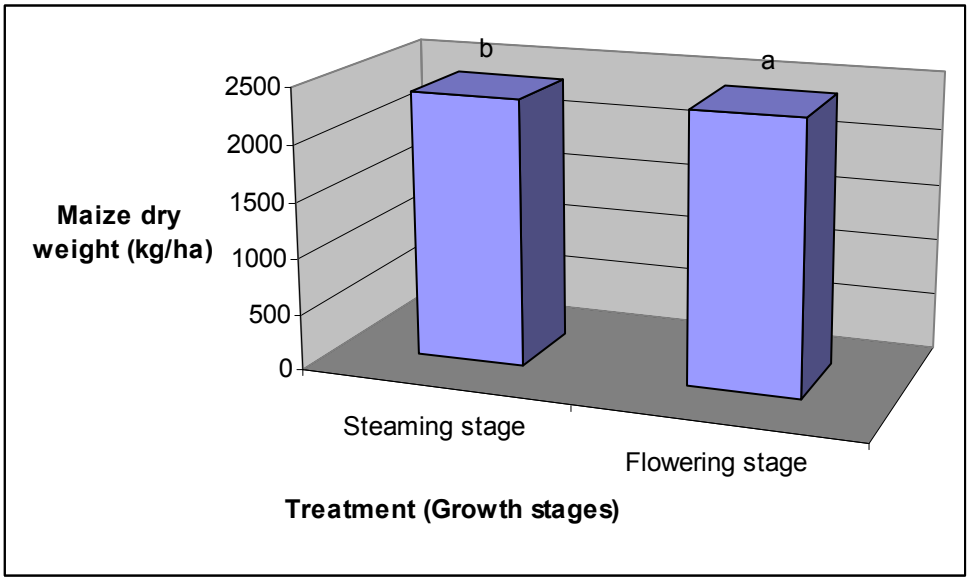

Fig. 2: Effect of Nano particles TiO_2 spraying on maize dry weight in maize.

4.3. Corn Yield

The results showed that the effect of TiO_2 Nano particles was significant corn yield in $P \leq 0.05$. The highest corn yield (1744.13 kg/ha) was achieved by flowering stage and lowest corn yield (1743.36 kg/ha) was achieved by steaming stage (Table 1, Fig 3).

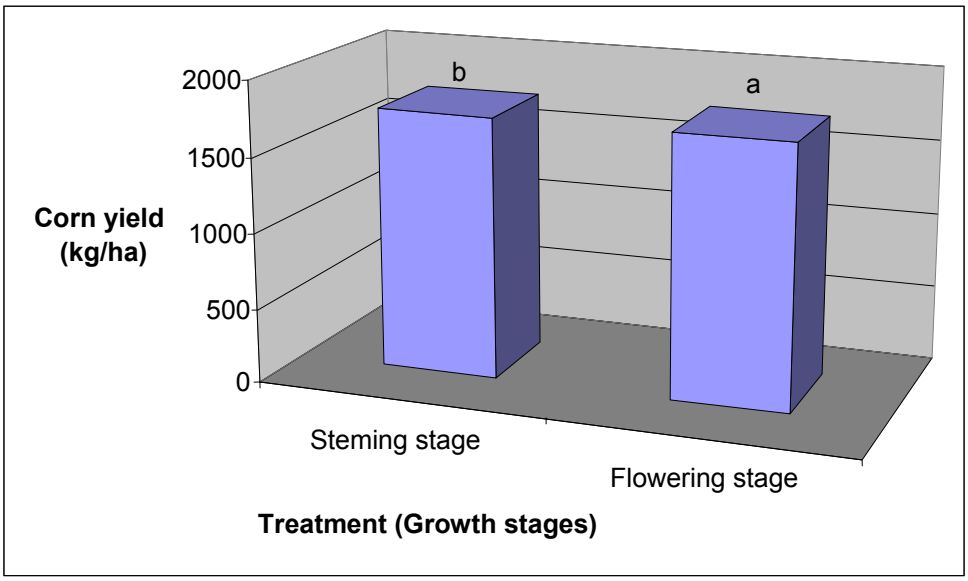

Fig. 3: Effect of Nano particles TiO_2 spraying on corn yield in maize.

Table1: Means Comparison

Treatment (Growth stages)	Number of corn in plant	Maize dry weight (kg/ha)	Corn yield (kg/ha)
Steaming stage	9.94 [b]	2364.38 [b]	1743.36 [b]
Flowering stage	10.10 [a]	2396.35 [a]	1744.13 [a]

The nano Tio2 treatment has obvious effects onthe improvement of growth and development inspinach, however, bulk tio2 treatment shows littleeffect(6). Nano anatase Tio2 could increase lightabsorbance, accelerate transport and transformation oflight energy (12). Application of Tio2 has been foundto show an excellent efficacy with a correspondent20% increase in grain weight due to the growth promoting effect of Tio2 nano particles (9). It hasbeen suggested that could promote growth ofsoybeans and could increase the strength of roots,enhancing the roots ability to absorb water andfertilizers (5).It is investigated that Nano Tio2 will have an important role on the corn as production and applications increase (8).Thus understanding the fate and potential of this nanoparticle has become a necessity.The results showed that stages and dosages of nanoTio2 have significant difference on morphological traits of corn such as plants height-corn dry weight.Researchers believed that prtesence of nanoparticles may cause an alternation in the available root surface area which can increase absorbtion ability and yield components.

5. Refrences

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