Plant Archives Vol. 18 No. 1, 2018 pp. 857-862 *ISSN 0972-5210*

BEHAVIOR OF SOME NANOMATERIALS IN IMPROVING THE GROWTH OF ONION PLANT, *ALLIUM CEPA* AND ITS EFFECT ON *PYTHIUM APHANIDERMATUM*

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Abstract

An experiment was conducted during the 2017/2016 agricultural seasons at the college of Agriculture, University of AL-Qadisiya under the conditions of the plastic house. The design of the complete random strata was used in three replicates for each concentration of nanomaterials concentrations (Zn, Cu, Fe). It showed the test results and a high Contrastive ability between the concentrations of nanomaterials and pathogenic fungus *Pythium aphanidermatum* as concentrations of nanomaterials dampened the growth of pathogenic fungus and the decline continue to grow to the end of dishes, with the highest rate of inhibition of 0.5 and 0.2 cm when using the copper element nanotube concentration of 1.5 and 3, followed by iron and Then zinc.

Among the trends that have been used in the control of plant diseases and increase the growth of the use of molecular nanoparticles micro-standards in small, as there is a close relationship between nutrition mineral elements and resistance to the plant for the causes of pathological and that the plant's resistance to cause patients can be adversely affected positively or negatively by factors surrounding environment.

The use of concentrations of 0.5, 1.5 and 3% (Zn, Cu, Fe) resulted in increased plant height, number of leaves and number of heads compared to control coefficients.

Key words : Nanoparticles (Zn, Cu, Fe), smart fertilizers, *Allium cepa*, *Pythium aphanidermatum*.

Introduction

The onion crop is one of the most important and important economic crops in many countries. It is characterized by its rich components such as iron, phosphorus, calcium, proteins and carbohydrates, as well as vitamins A and B (Humaidan *et al*., 2006; Singh *et al*., 1990).

It also benefits from its medicinal value, which is contained in the koristin compound, which is considered as an important antioxidant and anti-cancer compound. It also contributes to lowering cholesterol and sugar levels in the blood (Al-Sahaf *et al.*, 2003).

It also helps diuretic and helps to break up stones, heal wounds and extract iron from sores. *Allium cepa* is used for all types of bacteria. Alliaceae is a strategic crop in Iraq and the world, which is consumed by the individual in large quantities Al-Sahaf *et al.*, 2003; Khafaji *et al*., 2010; Cristina Buzea *et al*., 2007).

Therefore, the countries sought to cultivate it and increase the surface area cultivated to raise the level of production through interest in agricultural operations such as irrigation and fertilization, which are considered important processes that produce no onion plants only by their presence. Fertilization is used to obtain as much vegetative growth as possible (Khafaji *et al*., 2010).

And highlights the importance of fertilizer elements added to the soil to obtain good quality qualities of the crop, such as increasing the number of hatches and large head size and give a healthy form of the crop and get a quantity of good seeds later (Al-Tamimi *et al*., 2005; Abdali *et al*., 2007).

As there are many fertilizers that are added to improve the quality of the crop and increase soil fertility such as nitrogen fertilizers, organic fertilizers, bio-

fertilizers and many chemical fertilizers containing nutrients such as nitrogen, phosphorus, potassium and sulfur (Matloob *et al*., 2016).

In recent years, the modern science has turned to the use of so-called smart fertilizers or nanoparticles, which are added to the soil, either by mixing or with water for irrigation, to feed the plant, to accelerate growth, improve production and soil properties, adding them lead to the activation of carbonate representation and increase the effectiveness of antioxidant enzymes Direct effect on the recent studies have been carried out on these fertilizers added to the soil and its knowledge of their impact on plant growth (Khafaji *et al*., 2010; ADPFEU, 2008).

Many studies have shown that nanoparticles have the ability to increase chlorophyll dye in the plant (leaves), dry weight, paper area and plant yield are represented by *Cucurbita* sp.

There is also some studies that indicated that the use of nanoparticles provides many nutrients needed by the plant, which suffers from a lack of elements in the soil, which appear as symptoms of disease on the plant, if the availability of the element will result in the growth of the plant and large size of the bulbs (Al-Bashir, 2003; Alterra, 2013; Nogueire *et al*., 2012).

Some local researches have confirmed that the use of these substances has led to increased resistance of plants to diseases and to the reduction of fungal and bacterial diseases such as death and fall diseases, yellowing diseases and ulcers on tomatoes, cucumbers and potatoes (Abdali *et al*., 2000; Yuan *et al*., 2012; Abdel-Rahman, 2013).

In recent years, there have been many studies and research on the introduction of nanotechnology in the field of agriculture, which is called Agro Nano techno logy, which has had a positive impact of the missionary, including unless there are changes can be referred to, including the latest morphological and histological changes led to the emergence of qualities Is not desirable in the control of insect pests and *acrost* and monitoring the places of insect infections within agricultural fields and reduce the loss of agricultural crops and soil purification of modern elements that hinder the absorption of plants for nutrients and water (Khafaji *et al*., 2010; Cristina *et al*., 2007; Al-Hadithi *et al*., 2012).

It has been possible to use nanomaterials in agricultural fertilization as an alternative to traditional fertilizers at competitive prices and in smaller quantities and can be stored for longer periods due to their high stability under different circumstances and is involved in the process of dealing with some of the least important nanoparticles economically through the so-called Nano bioprocessing and prevention of diseases and microbial pathogens from Through the promotion of plant defenses by genetic modification within the plant cell in the so-called Nanogenetic modified or modified forms of pesticides to make them more effective and less harmful and widespread in the so-called Nanocides and can be the synthesis of nanomaterials m Some plants (Jabr, 2000; Al-Salti *et al*., 2008; Knauer and Pachell, 2009).

Which reduces the harm caused to humans and reduce the cost of extraction drawn such as silica nanoparticles with interfaces of rice straw, so considered this study to :

1. Effect of nanoparticles (Cu, Zn, Fe) and different concentrations on the growth and yield of onion plant.
2. Effect of concentrations of nanoparticles fertilizers on the fungus that causes the disease and fall of the seedling *Pythium aphanidermatum.*

Materials and Methods

1. Preparation of a PDA medium: potato dextrose agar

Prepare the medium using 200 g potatoes, 20 g sugar and 20 g agar and sterilize the medium with autoclave device at 120°C under 1 hour pressure, then extract medium and cold, then add 2 chloramphenicol to increase fungal growth and inhibit bacterial growth.

2. Preparation of nanomaterials

Nanomaterials that have significant benefits on soil and plants that benefit the local economy are used if three ready-made minerals are used by the company (cu, fe, zn) which are mainly plant feeders. Concentrations of each substance (3,1.5,0.5) to control unit 0% mg / l and each concentration of three replicates of each substance.

3. Isolation of fungal : *Pythium aphanidermatum*

The fungal samples were prepared by obtaining them from one of the infected onion farms. The millet seeds were used for the preparation of the fungal vaccine if the seeds were well washed and soaked for 6 hours.

Drain the seeds and place at 50 g of each 100 mL glass flask with a small quantity of distilled water and then fill the flask with a sterilizer and sterilize the device for a period of one hour and leave the beaker to cool. Each flask will be opened with five 5 mm diameter discs taken from the *Pythium aphanidermatum*, 4 days using

a platinum drill.

The incubators were incubated at a temperature of 28°C for 15 days, taking into account the rotten trunk every day to distribute the fungal vaccine on all seeds in a homogeneous manner.

The soil was fertilized with millet seeds and was transferred to sterile soil with formaldehyde with 5 g of millet seeds with 1 kg of soil, 0.5% weight / weight. Soil and vaccine were placed in a cellophane or plastic bag. Of sterile millet seeds of the same color as soil to sterile soil for three sticks, replicates as control and distributed in every 1 s.

Washes were then irrigated and placed in the plastic house with watering every three days. After 14 days, the percentage of dead shoots was calculated for the purpose of confirming the fungus, after which the seedlings were transferred to the ground.

4. Effect of nanomaterial concentrations on radial growth bands of pathogenic fungus and nature of fungi strings

Poisoned food technique was used to determine the effectiveness of nanoparticles tested in the pathogenesis of fungi by preparing three concentrations of each nanoparticle (3,1.5,0.5) mg / l in addition to control alone (without addition).

The concentrations were added to the Petri dishes on the food medium before hardening and stirred to smooth the material and left to solidify by three replicates per concentration.

The fungus of Cultivation were then planted on all concentrations and in all the dishes using pure isolates and with a flat borehole technique. A 5mm drum was placed in the middle of each dish and incubated The average growth rate of each of the different treatments compared to the control unit was measured at the rate of three orthogonal diameters after the arrival of the fungus in the control unit to the edge of the dish. The percentage of inhibition was calculated using the following equation:

(100% *) Comparison only in fungus diameters Average-treatment dishes in fungus

Diameters Average / Comparative dishes in mushrooms Diameters Average) = Inhibition Rate

Then, a part of the surfaces of the fungal colonies were taken by means of the infusion needle. They were placed on a glass slide and mixed with a diameter of sterile distilled water using lactophenol dye. The slide was covered with the lid and examined under the microscope to observe the effect of the material on the mycelium and spores as well as the abnormalities of the end of mycelium .

5. Preparing the land for agriculture

The laboratory was moved to the plastic house through the preparation of the ground and the area was chosen 2 square meters and designed the experiment according to the random sectors RCBD.

Results and Discussion

Soil analysis : The experiment was carried out between 1-12-2016 and 10-3-2017, where the phosphates were planted in the selected soil, which contains the middle of the agriculture whose physical and chemical properties are shown in table 1.

The results showed that there was a high resistance between the concentrations of nanoparticles and the *Pythium aphanidermatum* in table 2. Nanomaterials achieved high antibody ability using different concentrations of 0.5, 1.5 and 3%. The colony diameters of the *Pythium aphanidermatum* of the material were Zn 3.5, 2.5 and 1 cm, respectively.

In the case of addition of concentrations of Fe material, the rates of radial growth rates were 2.1, 1.3, 1.8 cm, while the addition of concentrations of nano Cu were the rates of radial growth diameters of fungi 1.4, 0.5, 0.2 cm, respectively, compared to the control unit 9 cm cultivation fungus nurse without adding any concentration of nanomaterials (Bell *et al*., 1982; Marsoumi, 1999) (Five-dimensional standard ladder).

These results are explained by the fact that these nanoparticles are tiny minutes capable of penetrating the walls of cells. This is consistent with the Agent's Adherents (2013) and Abdali (2000). These nanoparticles are capable of adhering to walls and then penetrating, absorbing and interacting with biological processes within the organism. Influencing the regulatory mechanisms of enzymes and proteins thus killing or destroying the cell (Matloob and Fenin, 2016; Agriculture in Lebanon, 2014; Samurai *et al*., 2003).

Among the trends used to control plant diseases and increase the growth criteria is the use of nanoparticles in nanomaterials. There is a strong relationship between nutrition, mineral elements and plant resistance to pathogens and plant resistance to pathogens can be adversely affected by environmental factors.

The use of concentrations of 0.5, 1.5 and 3% of the element Zn nanotubes led to an increase in the height of the plant as the rates of 26,27, 25 cm, which made a significant difference with the treatment of control 25 cm.

Table 1 : Soil analysis.

Standard Unit	Character	Value
Ingredients the soil	Clay	2.33
	The gluten	0.00
	the sand	06.42
	Calcium carbonate	20.25
	Organic substance	1.35
	Sand fabric	
Dm / m	Ec	1.12
Acidic	Ph	6.26
Mg / kg	N	67.10
	P	30.43
	K	593.13
Mmol / l	Ca ++	11.81
	Mg ++	9.21
	Na +	28.61
	Cl-	1.72
	SO_4 =	3.18
	HCO_3	2.45

Table 2 : Effect of addition of concentrations of Cu, Fe, Zn on *Pythium aphanidermatum* in the dishes.

Treatments	Concentrations Mg / l	Radial growth diameters	
		Total	Average
Zn	0.51.53	10.67.43	3.52.51
Fe	0.51.53	6.445.3	2.11.31.8
Cu	0.51.53	4.33.22.1	1.40.50.2
Con.	Without adding it	27	9
LSD	0.03		

Table 3 : Effect of nanomaterial concentrations on plant height.

Treatments	Concentrations Mg / l	Radial growth diameters	
		Total	Average
Zn	0.51.53	81 78 75	272625
Fe	0.51.53	74 75 62	252521
Cu	0.51.53	57 64 79	1921.326.3
Con.	Without adding it	75	9
LSD	0.43		

When using the same concentrations of Cu, the results were 25.25 and 21 cm respectively, which did not make a significant difference with the control treatment

When the Fe element was used, the height of the plant was 19 cm, which constituted a significant difference with the treatment of control as well as the rate of 21.3 cm, which formed significant differences with the control

Table 4 : Effect of concentrations of nanoparticles on the number of leaves.

Treatments	Concentrations Mg / l	Radial growth diameters	
		Total	Average
Zn	0.51.53	26 36 51	91217
Fe	0.51.53	17 28 53	69.318
Cu	0.51.53	44 55 62	1518.321
Con.	Without adding it	28	9.3
LSD	1.4		

Table 5 : Effect of nanomaterial concentrations on increasing the number of heads.

Treatments	Concentrations Mg / l	Radial growth diameters	
		Total	Average
Zn	0.51.53	12 19 21	46.37
Fe	0.51.53	15 21 32	5711
Cu	0.51.53	111626	45.39
Con.	Without adding it	7	3
LSD	1.7		

unit, while the rate of 26.3 cm, which did not notice any significant difference with the control treatment. These results explain that these substances have the ability to be soluble and absorbed by the plant as they increase the oxidative effect of the ascorbic acid enzyme, which affects the plant's vital functions, including plant height and size, flowering, fruits and the effect on chlorophyll (Khafaji *et al*., 2010; Khafaji and Kazim, 2010).

The difference in the addition of concentrations of nanoparticles achieved a great degree in obtaining the excellent growth parameters of the plant. In table 4, there were significant differences between the concentrations of the material and one substance and the effect on the number of onion leaves when adding Zn Nano concentrations of 0.5, 1.5 and 3% were.

The paper preparation rate was 912.17 sheets respectively, which made a significant difference with the Nano Cu, which had a rate of 6,9.3,18 sheets respectively, while adding the nano Fe results were 15, 18.5, 21 sheets compared with the control unit which was 9.3 Paper According to previous studies and based on some of the results of the researchers explained these results as these items Nanoparticles have the ability to stimulate vegetative cells in reproduction and elongation through direct influence on the composition of securities and increase the number of divisions as well as areas of influence on the hormones responsible for the formation and increase the paper prepared (Khafaji and Kazim,

2010; Marsoumi, 1999; Al-Hadithi, 2002).

The results of the analysis of table 5 showed that there were significant differences in the number of heads as there was a positive relationship. The higher the concentration of the nano, the greater the number of heads.

The addition of Zn 0.5, 1.5 and 3% to the soil increased the number of heads over time. And 6.3.3 for each concentration respectively. These results were compared with the Cu element of nanotubes, which had a head rate of 5,7.11 for each concentration respectively, and at the addition of the nanotube.

In the same concentrations mentioned in the table, the head preparation rates were 4, 5.3, 9 Concentration respectively. These results were compared with a control treatment whose output rate was 3 heads to explain these results.

The nanoparticles, if absorbed by the cells, help to accelerate their division instead of being a single sphincter generated a set of phosphates because of the influence on the cell structure and its genetic system, and this corresponds to the mater (Al-Sahaf and Hamoud, 2003; Matloob and Fenin, 2016; ADPFEU, 2008), which emphasized these minutes infinitesimal It is absorbed by cells as it conducts behavior that stimulates cells to divide repeatedly.

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