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ORIGINAL ARTICLES

Effect of Inoculation With Bio-Fertilizers on Germination and Early Growth Nitragin Medicinal Plant Dill (*Anethum graveolens*)

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ABSTRACT

In order to study effect of seed inoculation with nitragin as bio-fertilizer at concentrations of 2, 3 and 4 cc and distilled water as control on germination and early growth of dill (*Anethum graveolens*), a laboratory experiment was conducted in Islamic Azad University of Tabriz in completely randomized design with three replicates. The results revealed that in those dill seeds were inoculated with 3 cc nitragin, root length increased by 35%, compared with the control. In seeds treated with the same treatment seedling length increased up to 118 mm, and seedling length increased 23.8%, in comparison to check plots. When nitragin concentration reduced up to 4 cc, shoot dry weight increased nearly 0.63g. In 4 cc nitragin, seedling dry weight increased by 56%, and due to primed seeds with 4 cc nitragin improved 0.83 g. In the highest nitragin concentration CGR increased by 46%, compared in comparison with control. Also, the lowest CGR occurred in seeds treated with distilled water. It was concluded that dill producers could improve germination and early growth of dill by seed priming with nitragin.

Key words: Concentration, Dill, Germination, Nitragin.

Introduction

Good seed germination behavior is important for horticulture and agriculture. Uneven or poor germination and subsequently in homogeneous seedling growth can lead to great financial losses, by e.g., reduced possibilities for mechanization, or lower prices of in homogeneous plant batches (Ghiyasi et al., 2008 a) seed priming can increase speed and uniformity of germination (Ghiyasi et al., 2008 b). The inoculation of seeds or seedlings with micro-organisms has been adopted as a method of modifying microbial populations around crop plants to promote both development and yield. *Azotobacter chroococcum* was originally used as a seed inoculants because it was thought that its fixation of dinitrogen would provide a significant input to the nitrogen economy of plants (Cooper, 1959). Seed priming treatments can lead to better germination and establishment in many crops such as maize, wheat, rice, canola (Basra et al., 2005; Ghiyasi et al., 2008 a,b). Seed priming treatments include non-controlled water uptake systems and controlled systems (Ashraf et al., 2003). Amin (1997), who studied coriander (*Coriandrum sativum*), fennel (*Feoniculum vulgare*), and caraway (*Carum carvi*), showed that the growth was influenced by seed inoculation (*Azotobacter* and *Azospirillum*) with a half dose of inorganic fertilizer. Plant growth was nearly equal to that obtained when the plants were fertilized with a full dose of inorganic fertilizer. Pre-sowing seed treatments (seed priming) include hydro priming, bio priming, seed soaking, hormonal- priming, magneto- priming. Many resent researches suggested that seed priming of crop seeds might be a useful way for better germination, seedling growth, establishment and yield (Ghiyasi et al., 2008 a,b; Tajabakhsh et al., 2004; Sharafzadeh et al., 2006). Yousry *et al.* (1978) found that inoculation of pea (*Pisum sativum*) plants with *Bacillus megatherium* increased plant dry matter by 10.9%, while the combined application of *B. megatherium* and P-fertilizer increased dry matter by 19.7%. Seed germination and seedling emergence are influenced by several factors, these being mainly the seed, the environment, and various mechanical factors. The environment provides the basic requirements of light, heat, oxygen and moisture. The mechanical factors provide such aspects of the planting configuration as row spacing, seed placement distance, depth of sowing, seed rate, and degree of seed-soil contact. These may also modify the environmental factors (Montemayor,. 1995). Badran and Safwat (2004) and El-Ghadban *et al.* (2006) found that fennel responded to bio-fertilizer by increasing growth and oil yield and changing the chemical composition. These results are in agreement with those of Gad (2001) for fennel (*Foeniculum vulgare*) and dill (*Anethum graveolens*), who reported that biofertilizers on these plants increased growth and yield. Viable seed is capable of producing new plant under both favorable and unfavorable climatic conditions. Emergence of the seed lot having high vigor is more uniform and due to that it forms more vigorous seedlings which in turn provide better stand establishment (Baleševi.-Tubi., et al., 2007). The aim of this study, the effect of inoculation with manure on some biological

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traits in vitro nitragin and and study the use of dill nitragin in agriculture in order to achieve the goals of sustainable agriculture.

Material and Methods

The biotechnology laboratory experiments in 2008 at the Faculty of Agriculture, Islamic Azad University of Tabriz in Karkaj Was run at 15 km East of tabriz,Iran . This study consists of a separate experiments on the dill (*Anethum graveolens*) as a completely randomized design with four treatments 2, 3 and 4 cc nitragin, with distilled water control was performed with three replicates in vitro. nitragin (Azotobactin) fluid is water -soluble active ingredient it contains bacteria *Azotobacter spp*. ،*Azospirillum spp*., *Pseodomonas spp*. and the number of viable cells of each bacterial cell in a 108 ml solution (Okon, 2002). nitragin needed for tests that produce a chemical processing company has Zanjan, Agriculture Organization of East Azarbaijan province, had been prepared. Petrydish dishes and filter paper after disinfection with ethylic, In order to ensure the absence of any contamination to UV radiation for 24 hours under a sterile hood were electric. 50 seeds in each Petri dish and 25 healthy dill (*Anethum graveolens*) was considered healthy. In all treatments, seeds were disinfected with a solution of starch and sugar- coated and then inoculated with nitragin concentrations were studied. nitagin concentrations that were considered capable of wetting the seeds of each plant. Petri dishes in plastic bags inside the container grown 25± 1 ° C were transferred . The experiment lasted 10 days for each type of seed . In order to calculate the germination rate, Petrydish containers from the second day of testing each day until the tenth day of out-grown and the number of germinated seeds were counted. In this experiment, germination to seedling emergence was defined as at least 5 mm. In various stages of Petrydish visit, if necessary, distilled water was added to the wet filter paper . Traits measured, including root length, shoot length, seedling length , root to shoot ratio, root dry weight, shoot dry weight, Seedling dry weight, root to shoot ratio of dry weight , germination percentage and germination rate. after the tenth day, 10 samples randomly selected from each Petri After measuring root length, shoot length and seedling length, seedling dry weight determination, Samples in the oven for 24 hours at 75 ° C placed and then Laboratory scale carefully weighed on a milligram (Mettler). Germination was calculated using the following formula:

$R=\sum N / \sum(T\times N)$

N: number of seeds germinated at T^{th}, T: number of tests to begin counting the days and times and R., is germination . Analysis of variance by the software MSTAT-C and graphs were done with Excel software.

Results and Discussion

Dill (Anethum graveolens):

Radicle length:

The results revealed that in those dill seeds were inoculated with 3 cc nitragin, root length increased by 35%, compared with the control. The effectiveness of root length of dill seed inoculation with the biological fertilizer nitagain, expected that root length is also affected by the treatments, Compared to the averages (Table 2) indicate that dill seeds were inoculated with 3cc of distilled water nitagin compared with control, The value of this attribute increases by about 35 percent. If the amount of the increase in levels of seed treatment with doses of 2 cc and 4 cc nitagin 38.10 and 39.40 mm respectively. Cultures of dill seeds inoculated with 3 cc nitagin recommended. In plants inoculated with azospirillum or changes in the morphology of the root system. So that the root length and number subsidiary divisions that will increase and this enhances the absorption and root uptake of water and nutrients and ultimately increasing the performance (saleh rastin., 2001).

Seedling length:

The results revealed that in seeds treated with the same treatment seedling length increased up to 118 mm, and seedling length increased 23.8%, in comparison to check plots. Seedling length in plants inoculated dill seeds with different levels of biological fertilizer nitragin effect was reversible and compared the results of the treatments (Table 2) suggests that Impregnated by the seed treatment with 3 cc nitragin seedling length 23.8 percent ratio control (118 mm) of the other treatments were and the classes were statistically different. The effect nitragin 2cc with 114 mm, and the effect nitragin 4cc with 98 mm respectively. sorial et al., (1992), have reported that inoculation of tomato with some of the nitrogen fixing bacteria such as azotobacter Increase in seedling length, stem length and shoot dry weight was crop. The results with the findings Bhadauria et al., (2000) also is consistent. Impregnated with seed, fertilizer to improve plant growth in biological (Elzini.,2007).

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Plumule Dry Weight of Dill:

When nitragin concentration reduced up to 4 cc, shoot dry weight increased nearly 0.63g. Shoot dry weight in plants inoculated dill seeds with different levels of biological fertilizer nitragin effect was reversible and compared the results of the treatments (Table 2) suggests that Impregnated by the seed treatment with 2 cc nitragin shoot dry weight 0.50 g of the other treatments were and the classes were statistically different . The effect nitragin 3 cc with 0.33 g , and control with water 0.21 g.

Ratio of Radicle Dry Weight to Plumule Dry Weight:

The effectiveness of root dry weight to shoot dry weight ratio of dill seed inoculation with the biological fertilizer nitagain, expected that root dry weight to shoot dry weight ratio is also affected by the treatments, Compared to the averages (Table 2) indicate that dill seeds were inoculated with 4 cc of distilled water nitagin compared with control, The value of this attribute increases by about 56 percent. If the amount of the increase in levels of seed treatment with doses of 2 and 3 cc nitagin 0.68 g and 0.53 g respectively. Cultures of dill seeds inoculated with 4 cc nitagin recommended.

Percent of Germination Dill:

Treatments were compared (Table 2) showed , dill seeds were inoculated with 3 cc of nitragin , the germination percentage than the 63 percent increase and the 2 and 4 cc nitragin , the germination percentage than the 60 and 63 percent respectively. In a study in India , medicinal plants inoculated seeds *Emblica officinalis* , With bacteria brasilense A., Increased 11 percent during the shoot and consequently an increase in 16.5 percent that were of the seedlings (Bhadauria et all.,2000) .The results with the findings Sorial and colleagues (1992) is also consistent . The effect of treatments on the germination of seeds with azotobacter cumin by Rezai et al (2005) concluded that the seeds coated with bacteria as compared to 6.25 g per kg of seed germination increases. The germination of the plant cumin epygil , Relative length of seedlings that seem to improve the use of nitragin Early in the green and uniform product under field conditions may play a role.

Crop Growth Rate (CGR):

The results of variance analysis showed that biopriming of different seed priming showed significant difference at 5% level. Results of comparing different levels showed that priming had positive role in increasing crop growth rate. In 4 cc nitragin, seedling dry weight increased by 56%, and due to primed seeds with 4 cc nitragin improved 0.83 g. In the highest nitragin concentration CGR increased by 46%, compared in comparison with control. Also, the lowest CGR occurred in seeds treated with distilled water. The highest crop growth rate was 27.19 without priming. If the amount of the increase in levels of seed treatment with doses of 3 and 2 cc nitagin 17 and 11 g respectively. Cultures of fennel seeds inoculated with 3 cc nitagin recommended.

Table 1: Analysis of variance (mean squares) for biological traits in dill (*Anethum graveolens*)

S.O.V	Df	Root length (lr)	Shoot length (ls)	length Seedling	Lr/ls	Root weight (wr)	Shoot weight (ws)	Seedling weight	Wr/ws	GP	CGR
Treatment	3	144.29	219.82	527.75	0.027	0.002	0.102	0.12	0.006	135.62	652.77
Error	8	9.79	111.34	112.61	0.015	0.001	0.008	0.01	0.046	5.18	47.91
C.V(%)	_	8	15.93	10.07	20.45	20.29	21.16	18.06	18.22	12.81	14.08

Table 2: Comparison of means on fertilizer nitragin on biological traits of dill (*Anethum graveolens*)

	Root length (lr)	length Seedling	Plumule dry weight (g)	Seedling dry weight (g)	Wr/ws	Germination %	Crop growth rate
2cc Consumption Nitragin	38.10	114.5	0.50	0.68	0.68	60	11.71
3cc Consumption Nitragin	48	118.3	0.33	0.53	0.53	40	17.65
4cc Consumption Nitragin	39.40	98.73	0.63	0.83	0.83	63.33	27.19
Control (Distilled Water)	31.10	90.10	0.21	0.36	0.36	33.33	14.58
LSD (%)	5.893	19.98	0.1684	0.2063	0.14	4.288	13.03

Means with similar letter were not significant at the 5% probability level.

Conclusion:

The results showed that inoculation with 4 cc nitragin dill seeds before planting can, It significantly increased the seedling. Obviously, under these conditions, the seedlings are produced from high vegetative power. This product will eventually increase. Increase the effect of inoculation with the root of this plant

nitragin and the effect of these changes on the length and number of branches and sub- root, dill seed germination affected by seed treatment with nitragin rose sharply. The germination of seeds of dill, It seems that the relative improvement over the use of seedlings in the green timely nitragin and uniform seed is effective under field conditions.

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