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Study the Effect of Common fertilizers on Plant Growth Parameters of Some Vegetable Plants

A. A. Ramteke* and P. D. Shirgave

Department of Chemistry, Devchand College, Arjunnagar Tal. Kagal, Dist. Kolhapur (M.S.) India

ABSTRACT

The common fertilizers (Biozyme, Diammonium phosphate and Urea) were used to study the plant growth regulators on vegetable plants (Trigonella foenum graecum, Anethum graveolens and Brassica compestris). These vegetable plants have high nutritional and medicinal value. The growth parameters like germination, survival, seedling height and root/shoot ratio etc were studied on the seeds of Trigonella foenum graecum, Anethum graveolens and Brassica compestris at 0.01 M (v/v) solutions of fertilizers. The results found were used to assay the effect of fertilizers on vegetable plants.

Key words: Biozyme, Diammonium phosphate, Urea, Plant growth parameters, Vegetable plant.

INTRODUCTION

A plant's normal growth and function depend on relatively high intracellular water content. A plant-based diet – focusing mainly on vegetables, fruits and whole grains – has become one of the most important guidelines for lowering the risk of human diseases. Vegetable plants and human being have unique relationship since time immemorial and they are play a vital role in the human life. People should consume several hundred grammes of plant-based diet a day since it is a good source of nutrients and dietary fibre. Therefore, need to improve the nutritive value of the final products of vegetables plant. The important contributions of the nineteenth century, experimental plant physiology to agriculture was discovery that soil fertility and crop yields could be increased by adding several nutrients to the soil. Germination is an economical and simple Method for improving the nutritive value and several studies have reported [1-3] higher levels of nutrients and lower levels of antinutrients in sprouts compared to the ungerminated seeds. Biozyme which is toxin free eco–friendly bio-degradable product containing growth hormones, trace element, minerals and vitamins. It is used for higher yield and effective growth of plant and agricultural produces. It also increases the resistance of plant against various pest disease and climatic stress. Effects of Biozyme like to increase the yield of crop and quality of fodder and milk. Compatible with fertilizer and pesticides, increase the tollens capacity of the plant against pest disease and climatic strain. Increase the quality and rate of germination and flowers and fruits, setting by improving the size, colors, vitamin and proteins and starch in agriculture. Activity of thiocyanates of titanium as plant growth regulators has been reported [4]. The complexes of transition metals with bis-allyl thiourea and their herbicidal and plant growth regulating activity are tested with Wheat and Cucumber by Deverski *et al* [5]. The observation of antifungal and antibacterial activities on complexes

show that are more active as compared to free ligand and metal involved [6,7]. Studies on special structural requirement and complexation as a possible mode of pesticidal action have also been reported [8]. The pharmaceutical uses of metal complexes have been reported by many workers [9, 10]. Some bivalent metal ions have been reported to be useful in agriculture as plant growth regulators. Some common fertilizers are uses to increase the crop production. So necessitate concentrating on the study of common fertilizers for studying the germination pattern. Since, Biozyme**,** Diammonium phosphate and Urea have intense germination capacity because it's used as common fertilizers in the agriculture field and since no work is reported on the plant growth regulators of mentioned vegetable plants. Therefore, the aim of this work was to study the effects of Biozyme**,** Diammonium phosphate and Urea on germination process and growth regulators of *Trigonella foenum graecum, Anethum graveolens and Brassica compestris* plant because all these plants have high edible, nutritional and medicinal values.

MATERIALS AND METHODS

Fertilizers solution-For study, some selected fertilizers are Urea, Diammonium phosphate and Biozyme and 0.5% solutions of fertilizers were prepared by using distilled water.

Seeds- Healthy 15 seeds of *Trigonella foenum graecum, Anethum graveolens* and *Brassica compestris* plant were selected.

Soil-The basic requirement for this experiment was soil. Fertilized soil was collected from agricultural land. Stones and other hard material removed from it. It was then grind and filtered. This finely powdered soil was then filled with uniform layer in the Petri plates of equal size. The soil in the Petri plates was moistened with water. Sowing of seeds was done in this soil after one hour.

Trigonella foenum graecum, Anethum graveolens and *Brassica compestris* are selected as plant system in present investigation. These plants are ideal system to study the germination and growth pattern. Further, their economical importance is reflected by its wide used for the vegetable purposes. Healthy seeds of *Trigonella foenum graecum, Anethum graveolens* and *Brassica compestris* of equal size were selected for same germination were taken and thoroughly washed using doubly distilled water. 15 healthy seeds of equal size immersed in tested solution Healthy seeds of *Trigonella foenum graecum, Anethum graveolens* and *Brassica compestris* equal size were selected 15 seeds were soaked in water and kept in refrigerators for 3 hours, these healthy seeds of equal size were chosen were immersed in distilled water, Urea solution, Diammonium phosphate (DAP) solution and Biozyme solution with 7 hours. The seeds soaked were taken out of each solution and washed with distilled water. The seeds were sowed in the Petri plates in circle. The experiment carried out during 17 October to 17 November 2011, the Petri plates were kept under the atmospheric pressure and room temperature and to give the sun light treatment at morning 8 a.m. to 9 a.m. alternate days only.

Table.1. Effect of fertilizers on germination, survival and seedling height on *Brassica compestris*

Parameters	Control	Urea	DAP	Biozyme
No. of Seeds	15	15	15	15
%Germination After 3 days	66.66%	53.33%	60%	73.33%
% Survival After 6 days	93.33%	80%	86.66%	100%
After 10 days	100%	93.33%	86.66%	100%
After 15 days	100%	93.33%	86.66%	100%
Seedling Height in cm	0.3 cm	1.9 cm	0.7 cm	0.6 cm
Shoot Length in cm 6 days	3.0cm	2.8 cm	3.2 cm	3.4cm
After 10 days	3.5 cm	5.3 cm	5.6 cm	6.8 cm
After 15 days	7.2 cm	7.3 cm	7.6 cm	7.8 cm
Root Length in cm 6 days	1.5 cm	2.4 cm	3.9 cm	1.5 cm
After 10 days	1.9 cm	2.8 cm	4.1 cm	4.3 cm
After 15 days	5.9 cm	6.5 cm	6.2 cm	6.8 cm
Length of Young Leaf 6 days	0.3 cm	0.4 cm	0.3 cm	0.3 cm
After 10 days	0.4 cm	0.5 cm	0.4 cm	0.6 cm
After 15 days	0.7 cm	0.6 cm	0.7 cm	0.8 cm
Root/Shoot ratio	0.8	0.89	0.81	0.87

These plants are ideal system to study the germination and growth pattern. Effect of Urea, Diammonium phosphate and Biozyme on growth of plants was studied. A controlled set was similarly run using distilled water. Plant growth is decided on the basis of measured average value of parameters such as percentage of germinations, survival, seedling height, shoot length, root length and leaf area of young leaves compared with control system. The germination was noted after 3 days and Survival was noted after 3, 10 and 15 days. After noting the survival of the plants, they were taken out of the soil. The seedling height (root length/shoot length) and leaf area (width & length) of young leaf of survived plants were measured. Three sets of the experiments were arranged for study the parameters. The average values of these parameters are presented in table 1, 2 and 3.

Table.2.Effect of fertilizers on germination, survival and seedling height on *Trigonella foenum graecum*

Parameters	Control	Urea	DAP	Biozyme
Germination Seeds no.	15	15	15	15
%Germination After 3 days	73.33%	66.66%	66.66%	80%
% Survival After 6 days	100%	100%	100%	100%
After 10 days	100%	100%	100%	100%
After 15 days	100%	100%	100%	100%
Seedling Height in cm	2.5 cm	2.9 cm	2.2 cm	2.7 cm
Shoot Length in cm 6 days	0.7 cm	1.3 cm	1.0 cm	1.1 cm
After 10 days	4.1 cm	4.3 cm	4.2 cm	5.8 cm
After 15 days	5.5 cm	5.7 cm	5.8 cm	6.2 cm
Root Length in cm 6 days	2.3 cm	3.1 cm	3.0 cm	3.2 cm
After 10 days	2.6 cm	3.3 cm	3.2 cm	3.6 cm
After 15 days	2.8 cm	3.4 cm	3.3 cm	3.8 cm
Length of Young Leaf 6 days	0.5 cm	0.8 cm	0.6 cm	0.7 cm
After 10 days	0.7 cm	1.7 cm	0.9 cm	1.9 cm
After 15 days	0.9 cm	2.7 cm	1.5 cm	2.5 cm
Root/Shoot ratio	0.50	0.59	0.56	0.61

Table.3.Effect of fertilizer on germination, survival, and seedling height on *Anethum graveolens*

Parameters	Control	Urea	DAP	Biozyme
Germination Seeds no.	15	15	15	15
%Germination After 3 days	80%	66.66%	60%	73.33%
% Survival After 3 days	-	-	-	-
After 10 days	93.33%	80%	73.33%	86.66%
After 15 days	80%	100%	93.33%	86.66%
Seedling Height in cm	0.3 cm	0.5 cm	0.6 cm	0.7 cm
Shoot Length in cm 3 days	-	-	-	-
After 10 days	4.4 cm	5.8 cm	4.9 cm	8.9 cm
After 15 days	6.5 cm	6.8 cm	7.0 cm	9.1 cm
Root Length in cm 3 days	-	-	-	-
After 10 days	2.2 cm	2.6 cm	2.4 cm	2.8 cm
After 15 days	3.9 cm	4.1 cm	5.4 cm	5.9 cm
Length of Young Leaf 3 days	-	-	-	-
After 10 days	0.6 cm	0.7 cm	0.4 cm	0.9 cm
After 15 days	0.711cm	0.711 cm	0.811 cm	0.911cm
Root/Shoot ratio	0.60	0.60	0.84	0.64

RESULTS AND DISCUSSION

Plant growth regulator technique (PGR) are most important to study the parameters such as percentage of germinations survival, seedling height, shoot length, root length and leaf area of young leaves having high values compared to control system. 1) The germination was noted after 3 days. 2) Survival was noted after 3, 10 and 15 days and also noted germination after 3, 10 and 15 days. 3) After noting the survival of the plants, they were taken out of the soil. The seedling height (root length/shoot length) and leaf area (width & length) of young leaf of survived plants were measured. The average values of these parameters are presented in table 1, 2 & 3. In the present investigation, effect of the Urea, Diammonium phosphate and Biozyme on percentage of seed germination,

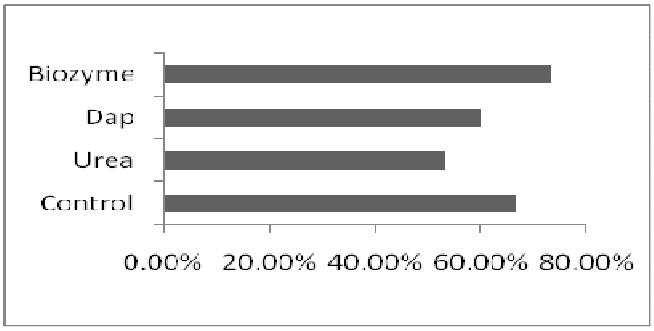
root length, shoot length (root /shoot ratio) and seedling height etc. have been studied. The general order of plant growth regulators found is as –

1. For ***Brassica compestris*** -Biozyme > Urea > Control > DAP
2. For ***Trigonella foenum graecum***- Biozyme > Urea > Control > DAP
3. For ***Anethum graveolens***- Biozyme > DAP > Urea > Control

Thus, the above order of fertilizers for plant regulators determined from the table 1, 2 and 3 and Biozyme fertilizers can functions as good plant growth regulators for selected vegetable plants. The percentages of seed survived are found to be greater after 15 days for all the plants in all the fertilizers solutions. Seedling height is observed high in Biozyme for *Anethum graveolens* but for *Brassica compestris and Trigonella foenum graecum* it is higher in the solution of Urea**.**

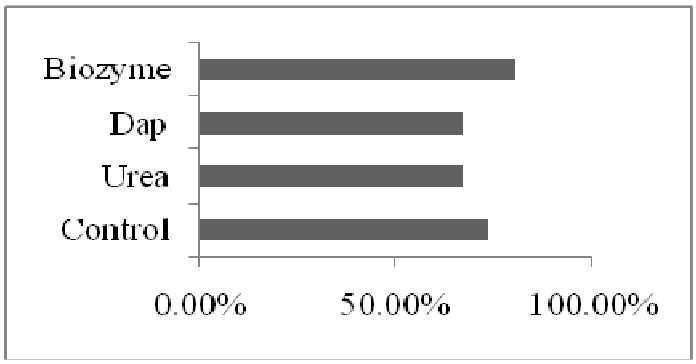
Percent Germination-Seed Germination is one of the major aspects of plant physiology. To understand an actual development in an organism one has to go through in its life cycle. Plant development is a cyclic process. Germinating seed is a convenient place to begin because seeds are quiescent or resting organs that represents a normal hiatus in life cycle. When the conditions are appropriate, the seed will renew its growth and geminates. Such an important phenomenon will be affected by different conditions. It was cleared from table 1, 2 & 3 that, the percent germination showed less than that of control (distilled water) on ***Anethum graveolens*** plant but in another two plants it is increased in the treatment of Biozyme. It is clearly indicates in the Fig.1, 2 and 3.

Fig.1. For *Brassica compestris* as a treatment plant system.
Plots of % Seed germination Vs Different fertilizers



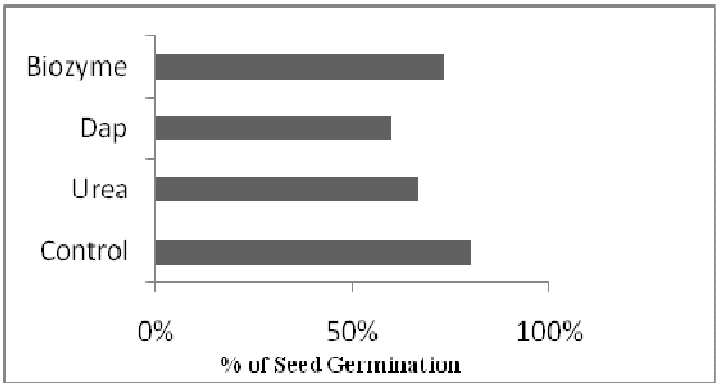
% of Seed Germination

Fig.2. For *Trigonella foenum graecum* as a treatment plant system.
Plots of % Seed germination Vs Different fertilizers



% of Seed Germination

Fig.3. For *Anethum graveolens* as a treatment plant system.
Plots of % Seed germination Vs Different fertilizers



Root length, Shoot length and Root/Shoot Ratio

Germination starts when the seed shows emergence phase of growth, which begins with penetration of embryo from the seed coat and end with the development of root and shoot system. The elongation of shoot axis follows emergence of radical. In the seedlings, the hypocotyls are the first to elongate, pulling the cotyledon and the enclosed first foliage leaves up through the soil. The rate and extent of elongation is subjected to a variety of controls, including nutrition, hormones and environmental factors. The shoot apical meristem contains a small number of dividing cells that give rise to all of the other cells and tissues in the primary shoot, including stem, leaves, branches and flowers. The root apical meristem appears structurally less complex than the shoot apical meristem. Though the root and shoot development start within a fraction of time but the further developments may vary according to the nutrients required for the development of root and shoot independently. Therefore, root and shoot lengths differ. Table 1, 2 & 3 clearly indicates that average shoot length is greater than root length and it is found higher in Biozyme solution than Urea, DAP and Control also. In the table 1, 2 & 3 clearly indicates that Root/ Shoot ratio is found nonlinear with all the solutions for all the plants But the length of young leaf is found greater (After 15 days) in Biozyme solution for all the system.

CONCLUSION

The average values of these parameters are presented in table 1, 2 & 3and % germination at different fertilizers showed in Fig 1, 2 & 3.The data represented in the table 1, 2 and 3showed the good effect of different fertilizers (Biozyme**,** Diammonium phosphate, Urea) on percentage seed germination, root length, shoot length (root /shoot ratio) and seedling height etc. But all the vegetable plants are responses with Biozyme fertilizer solution. So it can be concluded that, the Biozyme can functions as good plant growth regulators.

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