THE EFFECT OF DIFFERENT PHOSPHORUS DOSES ON THE QUALITY OF PEPPER SEEDLING

ABSTRACT

Aims: Phosphorus (P) is part of the nuclei acid structure of plants which is responsible for the regulation of protein synthesis. Phosphorus plays a major role in the growth of new tissue and division of cells. Plants perform complex energy transmissions, a function that requires phosphorus. If the value of phosphorus in your land is low, this can be stressed enough. One of the benefits of phosphorus in plants is proper development of the roots and hastening of maturity. Phosphorous is important element of plant growth and productivity. Phosphorus is an effective element in root development.
Study Design: Amounts of nitrogen, phosphorus and potassium as fertilizer applications in seedling cultivation affect seedling quality. Effects of different doses phosphorus (0, 50, 100 and 150 ppm) application on the quality of cucumber seedlings were investigated at in the study. İstek F_1 pepper cultivar was used. Macro nutrients were 100 ppm N, 100 ppm K, and the appropriate nutrients were given in the appropriate amount.
Results: The increase rates were found to be statistically significant at 1% level. At the end of a 35-day development period, seedling length was measured as 6.56 cm in the control application and 10.7 and 10.4 cm in the 100 and 150 ppm application of phosphorus doses, respectively. Hypocotyl length was 1.58 cm in control application, 1.66 in 50 ppm, 2.02 cm in 100 ppm P and 1.56 cm in 150 ppm application.
Coclusion: Leaf number, stem diameter, root height, root weight and leaf wiegt were determined in the study. Phosphorus applications increased the amount of leaf weight and root weight. . It was determined that 50 ppm P application was insufficient, ideal results were obtained in 100 ppm P application.

Keywords: Phosphorus, pepper seedling, quality, leaf weight

1. INTRODUCTION

Phosphorus is a basic nutrient macro nutrient that makes up about 0.2% of plant dry matter [1]. Phosphorus is one of the 17 nutrients required. The functions of phosphorus for plant growth cannot be performed by any other nutrient. Sufficient P is required for optimal growth, growth and reproduction of plants. P deficiency reduces plant growth which is attributed to either decrease in photosynthesis or increase in energy investment. Its limitation negatively impacts crop yield and quality. It has been estimated that P deficiency reduces the crop yields on 30–40% of the world's aerable land [2].
In the production of the plant removes high amounts of P from the soil. It promotes initial root formation and growth. Phosphorus is involved in the structure of phospholipids and nucleic acids, but is one of the essential nutrients necessary for ATP-related reactions. One of the most important tasks is energy storage and energy transfer. Adenosine-diphosphate (ADP) and Adenosine-triphosphate (ATP) compounds serve as the central element and provide energy transfer [3].

Phosphorus is a very immobile nutrient in soil [4-5]. Higher soil phosphorus fertilizer applications are applied in soil conditions where phosphorus intake is difficult [6]. In the lack of phosphorus in the plant, the transition of the carbohydrates primarily to the roots occurs and as a result, the roots increase [7]. In fertilization of cultivated plants, base fertilizers are preferred with sowing, whereas the use of fertilizers with high solubility in soilless agriculture yields more positive results. These include alterations in root architecture, formation of cluster roots, shoot development, organic acid exudation and alternative glycolytic and respiratory pathways [8].

It is known that correct fertilization programs applied in seedling cultivation increase the market quality of the plant. The high seedling quality will help to make the plant more dynamic and increase its resistance to diseases and pests in parallel with forming an effective root system after planting.

The aim of this study is to investigate the effects of phosphorus fertilizer application on seedling quality in seedling production plants and to determine ideal phosphorus fertilizer dosage.

2. MATERIAL AND METHODS

2.1 Experimental Site and Plant Variety

The experiment was conducted in 2018 in a heated polycarbonate greenhouse**.** İstek F1 type pepper variety was used in the experiment.

2.2. Soil Materials

Pepper seeds were planted in 70% peat 30% perlite mixed seedling mortar according to the volume principle to 150 viols. Kekkila peat (Brown Sphagnum peat) was used in the study. The nutrient content and some properties of peat are given in Table 1.

Table 1. Nutrient concentrations of sphagnum peat

Org. material (%)	pH	EC (dS m^{-1})	N	P_2O_5	K_2O	MgO	SO_3	Fe (mg l^{-1})	Mn	B	Zn	Cu	Mo
95	5,5	2,5	140	160	180	10	187	0,9	1,6	0,3	0,4	1,5	0,5

2.3. Study Design

After the seed sowing, the tops of the viols were covered for 3 days and the seeds were swollen evenly in the viol without loss of moisture from the viol. When the plants were seen, Hoagland solution was applied seperately to fertilize the study. As in the seedling production facility, the subjects were separated into the viols and the fertilization spraying path was applied equal to the plants and the moisture contents were applied twice daily. Four solution tanks were prepared. The solution was applied to the tanks without phosphorus and from 50, 100 and 150 ppm P phosphoric acid source. 200 ppm N and 200 ppm K were applied equally to the solution tanks. Similarly, 50 ppm Mg, 50 ppm Ca and optimally micro elements were introduced into the solution tank.

2.4 Data Collection

When the seedlings ready for sale were seen (35 days), various measurements were made in the plant samples and records were kept. In this study, the parameters such as wet

weight, seedling length, root age weight, root length, hypocotyl length, trunk diameter were examined. Analysis of variance of the data was made and grouped by Duncan test.

3. RESULTS AND DISCUSSION

Table 2 shows the effects of different phosphorus doses on some characteristics of pepper plant in seedling growing environment where peat-perlite is used as substrate.

Table 2. Effects of phosphorus doses on some characteristics of seedlings of pepper plant

Aplications	Seedling length (cm)**	Hypocotyl Lenght (cm)**	Trunk diameterr (mm)**	Number of leaves (num./plant)**	Leaf wet weight (gr/plant)**	Root wet weight (gr/plant)**
P0	6.56 c	1.58 c	1.66 c	6.45 c	9.66 d	6.31 d
P1	8.81 b	1.66 b	2.03 b	8.29 b	18.3 c	7.81 c
P2	10.7 a	2.02 a	2.48 a	7.70 bc	20.3 b	8.20 b
P3	10.4 a	1.56 c	2.39 a	8.48 a	22.6 a	8.60 a
Ort.	9.11	1.68	2.14	7.73	17.6	7.73

The differences between the means in each column were determined by Duncan test.
Ö.D: Not important; * P <0.05; ** P <0.01 is important;

In parallel with the application of different doses of phosphorus to pepper seedlings, seedling length, hypocotyl length, stem diameter, number of leaves, root age weight and leaf age weight parameters were increased. The increase rates were found to be statistically significant at 1% level. At the end of a 35-day development period, seedling length was measured as 6.56 cm in the control application and 10.7 and 10.4 cm in the 100 and 150 ppm application of phosphorus doses, respectively. Hypocotyl length was 1.58 cm in control application, 1.66 in 50 ppm, 2.02 cm in 100 ppm P and 1.56 cm in 150 ppm application.
During early seedling development, the plant needs a high amount of phosphorus. Therefore, it shows a weak root development and a weak vegatative structure. A good root development will lead to an increase in biomass of the plant by providing more water and nutrient uptake. The data in the table shows the effect of phosphorus deficiency on root development and total biomass. An increase in leaf number and leaf weights was recorded in parallel with the phosphorus doses applied. Leaf wet weight of pepper seedling was measured as 9.66 g / plant in control application, 18.3 g / plant in 50 ppm P application, 20.3 g / 7 plant in 100 ppm P application and 22.6 g / plant in 150 ppm P application. Root wet weight was recorded as 6.31 g / plant in seedlings without phosphorus application, and as 7.81, 8.2 and 8.6 g / plant in 50, 100 and 150 ppm P applications, respectively. In the study, 100 ppm P and 150 ppm P applications were obtained important results in terms of plant values.

4. CONCLUSİON AND RECOMMENDATION

Phosphorus from plant nutrients is used for root development and especially for energy transfers. In seedling fertilization, nitrogen, phosphorus and potassium ratios should be balanced in nutrient solution tanks. The nitrogen, phosphorus and potassium ratios in the food solution tanks should be adjusted in a balanced manner. This ratio should be 2.5-1-2.5 N-P-K and should be adjusted by the manufacturer according to the plant growth status. Inadequate nutrients due to short development period of seedlings will reduce the quality of seedlings market. In our study, it was found that phosphorus increased plant growth with the parameters examined. It was determined that 50 ppm P application was insufficient, ideal results were obtained in 100 ppm P application and no significant increase was observed in 150 ppm P application compared to 100 ppm P application. The resulting data show similar results in similar studies [9-10]. In our study, the application of 100 ppm P and slightly higher doses will be beneficial in terms of finding N-P-K ratios and application to seedlings. There is a shortage of literature on fertilizer doses to be applied in seedling cultivation. This and similar studies will provide resources for producers.

COMPETING INTERESTS

Athours have declared that no completing intersets exist.

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