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Studies on Effect of *Parthenium* compost on Germination of Brinjal

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Abstract

Parthenium compost shows effective result on germination of brinjal seeds. Germination studies were the treatment of *Parthenium* compost on germination percentage, root and shoot length, fresh weight, dry weight, vigour index, emergence index, speed of germination and coefficient of velocity of germination. The biochemical constituents like protein, total carbohydrates, DNA and RNA observed effective result than nontreated also effective result observed in enzyme activity like amylase, protease and catalase.

Introduction

Plant nutrition is one of the most important factors in controlling agricultural productivity and quality. The greatest option for nutrition for plant and soil is organic fertiliser. Organic farming provides long term soil fertility. Organic farming will boost food yields and provide a clean, pollution free environment (Ramesh *et al*., 2005). *Parthenium hysterophorus* is useful for soil conditioning as it contains two times more nitrogen, phosphorus and potassium than farm yard manure it utilized effectively as organic fertiliser (Angadi *e tal*.,1977). *Parthenium* composting is an organic method of recycling solid waste. *Parthenium* compost is a vital source of food and energy for the soil food web because it contains both macro and micronutrients, a varied microbial community, stable organic compounds (such humic compounds), and labile organic matter.

Brinjal is an easily cultivated fruit vegetable belonging to family solanaceae

which can grow all over the world round the year. The seeds of solanaceous fruit vegetable like brinjal were germinated and its effect of *Parthenium* compost on germination and growth of seedling was studied in the present investigation.

Materials and Methods

The experiments were conducted in P.G Research Centre in Botany, Tuljaram Chaturchand College, Baramati, Dist. Pune (M.S.) on seeds of solanaceous fruit vegetable Brinjal (*Solanum melongena* L. Panna ARBH-928). The seeds were washed under running water and rinsed with distilled water.

The various parameters like germination percentage, length of radical, length of plumule and biomass were measured on 6 DAS using routine laboratory methods. Vigour Index (VI) was calculated according to the method suggested by Abdul Baki and Anderson (1973).

Vigour Index
= (Root length
+ Shoot length) X Germination percentage

Emergence Index (EI) was calculated by the following formula given by Baskin (1969).

$$EI = \frac{n1}{dn1} + \frac{n2}{dn2} + \frac{n3}{dn3} \ldots + nx/dnx$$

Where, n = number of seeds emerged on the day (1st), dn = number of days from the day of sowing, dnx = number of days to the final count.

Speed of Germination (SG) was calculated by the formula given by Maguire (1962).

$$SG = n/t$$

Where, n = number of seeds emerged on the day, t = time or days from sowing.

Coefficient of Velocity of Germination (CVG) was calculated by the formula given by Kotowski (1962).

$$CVG = \text{sum of } n/\text{sum of } (nt)X100$$

Where, n= number of seeds emerged on the day, t = time or days from sowing

Biochemical constituents were analysed on 12 DAS, using methods proposed by Lowry *et al* (1951) for proteins, Sadasivam and Manickam (2005) for total carbohydrates, DNA and RNA (Sadashivam and Manickam, 2005). The enzyme activity of amylase and catalase was studied as described in Sadasivam and Manickam (2005), that of protease by the method of Penner and Ashton (1967). Enzyme activity was studied on 12 DAS. The experiments were done in triplicates. Emergence of radical was considered as indicator of germination. Number of seeds germinated were noted daily.

Results:

The experiment fig.1 shows positive result of effect of *Parthenium* compost on germination. All these plants showed in

table no.1 increase in root length as well as shoot length. The percentage increase in Vigour Index (VI) over non treated was highest in brinjal. The percent increase in biomass was equal in brinjal. The Emergence Index (EI) revealed increase in Brinjal over non treated. The speed of germination (SG) showed increase over control sequentially in brinjal. Increase in Coefficient of Velocity of Germination (CVG) was to the same tune in brinjal.

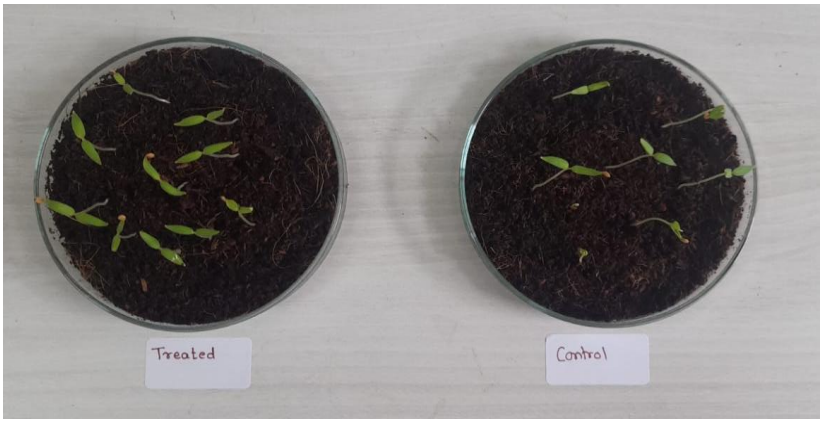

Fig. 1 Seed Germination

Table 1. Effect of *Parthenium* compost on germination of Brinjal seeds.

Parameter	Control	Treated	Increase (%)
Germination percentage	84±4	92±4.8990	9.52
Root length (cm)	6.82±0.1685	6.9±0.1643	1.17
Shoot length (cm)	5.16±0.0510	5.6±0.1517	8.53
Vigour index	1003.2±66.8371	1151.2±71.82	14.75
Emergence index	2.386±0.1560	2.642±0.1672	10.73
Speed of germination	1.408±0.0641	1.528±0.0808	8.52
Coefficient of velocity of germination	139.96±6.6600	153.28±8.1568	9.52
Fresh weight g/10 seedling	0.31±0.0100	0.5±0.0063	61.29
Dry weight g/ 10 seedling	0.0304±0.0002	0.05±0.0032	64.47

Table 2. Effect of *Parthenium* compost on biochemical constituents of Brinjal seedling.

Biochemical constituents	Control	Treated
Protein g/100g	5.02±0.02	8.06±0.024
Carbohydrate g/100g	5.36±0.068	9.54±0.040

DNA g/100g	0.96±0.024	1.78±0.020
RNA g/100g	1.56±0.040	2.76±0.075

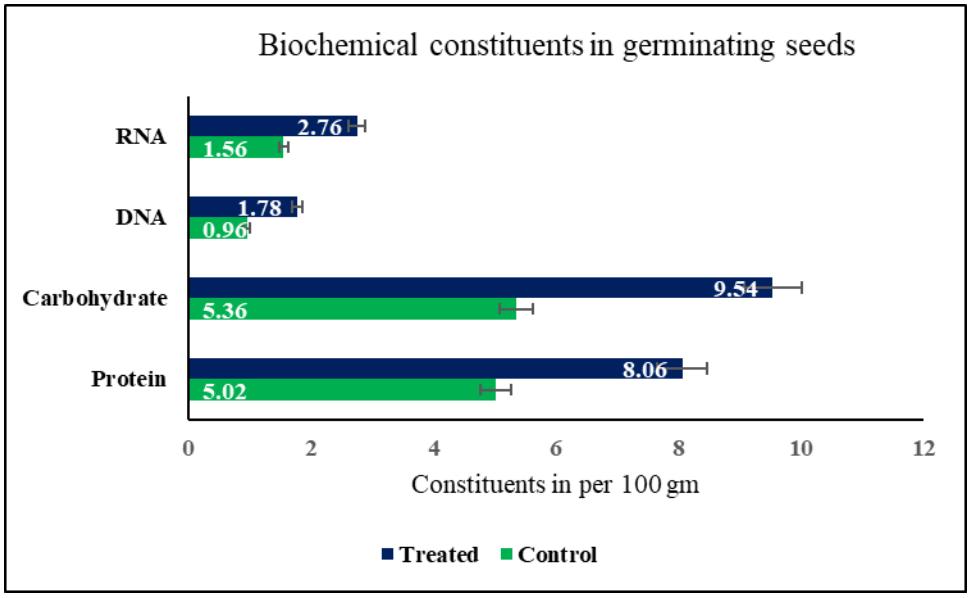

Fig. 2 Biochemical constituents in germinating seeds

Table 3. Effect of *Parthenium* compost on enzyme activity of Brinjal seedling.

Enzymes	Control	Treated
Amylase (mg maltose/5min/g fw)	0.216±0.004	0.626±0.010
Protease (µg tyrosine/hr/mg protein)	0.962±0.007	1.24±0.024
Catalase (µmoleH_2O_2/min/mg protein)	0.72±0.010	2.24±0.060

Biochemical constituents were analysed at 12 DAS. Brinjal showed table no. 2 and fig no.2 a significant percent increase over non treated respectively. However, the percent increase in total carbohydrates in Brinjal respectively. DNA content increased by Brinjal respectively over non treated in case of RNA content.

In table no. 3 The enzyme activity was studied at 12 DAS. Percentage increase in amylase activity. Protease activity was high in brinjal. Catalase activity showed increase in brinjal.

Discussion

Observations are recorded of the seeds of solanaceous fruit vegetable like brinjal positive response than nontreated seeds Vigour Index (VI) is the best criterion to assess the effect of any external agent on seed germination and seedling growth because it is calculated on the basis of germination percentage, root length and shoot length. The present investigation assures higher vigour index by treatment with parthenium compost. The same is true for emergence index, speed of germination and coefficient of velocity of germination.

The biochemical constituents like soluble proteins, total carbohydrates and DNA and RNA showed an increasing result. Seed germination is associated with degradation and mobilization of reserve food, accumulated during seed maturation. The efficiency of reserve food mobilization during germination and seedling establishment depends on the extent of reserve accumulation during seed maturation along with synthesis and activation of enzyme. So, germination and mobilization of storage reserve are independently regulated (Fait *et al*.2006). This is well reflected in the result of present investigation where protein and carbohydrate content showed increase along with increase in enzyme activity of protease and amylase.

The present investigation showed increase in the activity of enzyme amylase, protease and catalase in brinjal studied. All observations showed that treatment with parthenium compost increased germination percentage, root length, vigour index, emergence index, speed of germination and coefficient of velocity of germination. It also improved the concentration of biochemical constituents like proteins, total carbohydrates and DNA and RNA. In addition, enzyme activity amylase, protease and catalase was also found to be enhanced.

Conclusion

Parthenium compost improves germination percentage and has a higher nutrient value. It can be prepared easy. It is a balanced bio-fertilizer, with more nitrogen, potassium and phosphorus than other manures as well as micronutrients. It increasing the productivity and improving the soil structure, it is eco-friendly and beneficial for agriculture.

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