

Evaluation of Promotary Effect of Penergetics - K[®] on *Abelmoschus esculentus* (L.) Moench

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Abstract: Organic manures have become increasingly popular and far more effective in recent years. Manure and compost not only supply nutrients for crop production, including micronutrients, but they are also valuable sources of organic matter. Organic matter improves soil structure, water-holding capacity of coarse textured sandy soils, improves drainage in fine-textured clay soils, provides a source of slow release nutrients, reduces wind and water erosion and promotes growth of earth worms and other beneficial soil organisms. In this study, growth and biochemical characteristics of *Abelmoschus esculentus* (L.) Moench grown in mixture of soil containing various concentrations (10, 20, 30, 40 and 50%) Penergetics – K[®] were analyzed. After 20 days of treatment, growth parameters like shoot length, root length, fresh weight and dry weight were increased, pigment content, biochemical and enzymatic characteristics except amino acid were also increased with increase in the concentration of fertilizer compare to the control. From this study various concentrations that the application of Penergetics – K[®] on the soil has improved plant growth proving its fertilizing effects.

Key words: Penergetics - K[®] • Biochemical characters • Organic manure • *Abelmoschus esculentus*

INTRODUCTION

The increasing human population has led to intensive cultivation without adequately replenishing soil nutrients. The result has been the decline in crop yields and depletion of the resource base. The soils become fragile, quickly lose organic matter and nutrients when exposed to harsh environmental conditions or intensive cultivation. Plant nutrition is one of the most important factors that increase plant production. Fertilizer is any organic and inorganic material of natural or synthetic origin that is added to soil to supply one or more plant nutrients essential for the growth of plants. Inorganic fertilizer use has significantly supported global population growth. Nitrogen fertilizer is one of the major inputs in agricultural systems for higher crop production. Large amount of nitrogen derived from biological fixation have been shown to be present in rice plants [1]. Organic manures are loaded in natural, plant based proteins. Our organic products are now predominantly produced from soybean meal, which is high in protein and an excellent choice for improved overall health and increased growth. They contain seaweed meal which adds valuable

micronutrients, growth hormones and vitamins which help disease tolerance, reduce plant stress from drought and increase frost tolerance. Proper use of manure and compost is essential from both a production and environmental standpoint.

In the present study, commercially available organic manure namely Penergetics - K[®] has been taken to study the impact on *Abelmoschus esculentus* (L.) Moench. Penergetics - K[®] can also apply (dry or wet) while turning the compost piles or windrows.

MATERIALS AND METHODS

The seeds were soaked in distilled water for 2 hours. Both control and experimental seeds were allowed to grow in plastic trough containing various concentrations (10, 20, 30, 40 and 50%) of Penergetics - K[®] mixed with uniform amount of garden soil. After 20 days the morphometric, biochemical and enzymatic characters were analyzed. A trough without the Penergetics - K[®] also kept as control. Morphometric characters such as shoot length, root length, fresh weight and dry weight were analyzed used by meter scale and weighing balance.

Biochemical characteristics and pigmental characteristics were analyzed by content followed by [2], Anthocyanin content was estimate by [3]. Estimation of protein followed by [4]. Glucose and total free amino acids content were analyzed by [5] method. The method of [6] used to determine the leaf nitrate content. *In vivo* nitrate reductase activity was assayed according to [7] method.

Statistical Analysis: Morphometric parameters were determined with ten independent replicates. Biochemical characters and enzymatic assay were carried out at least five times. The data were reported as mean \pm SE and the figure in parentheses represent the percent activity.

RESULTS AND DISCUSSION

A beneficial effect was observed on the growth of *Abelmoschus esculentus* (L.) Moench when various concentrations of Penegetics - K[®] applied. The plant height, fresh weight, dry weight was increased significantly with the treatments (Table 1 & Fig. 1). Similar increase was observed when compost and organic fertilizers were added to soil amendments [8, 9]. The combined effect of vermicompost and nitrogen fertilizer significantly increased the plant height, fresh biomass production and dry biomass production [10].

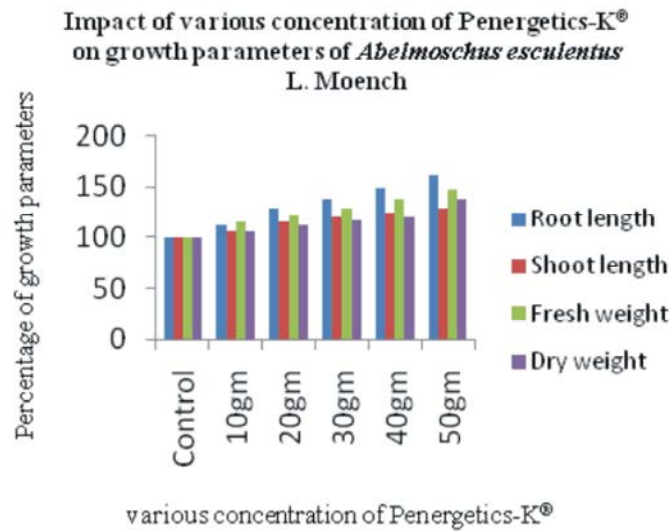


Fig. 1:

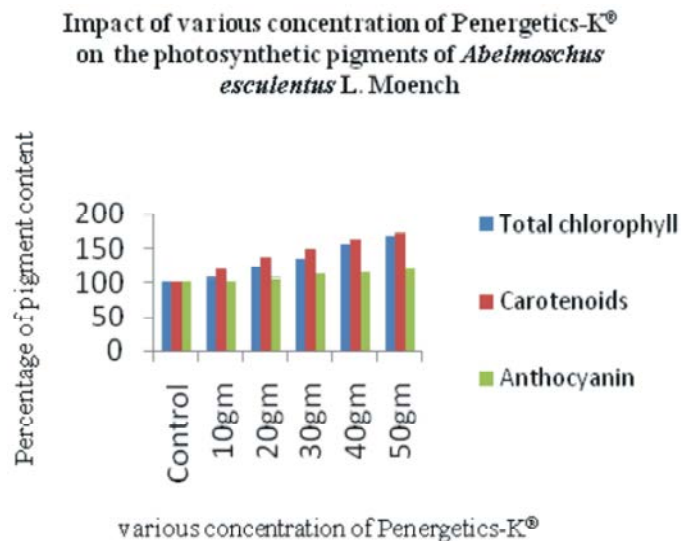


Fig. 2:

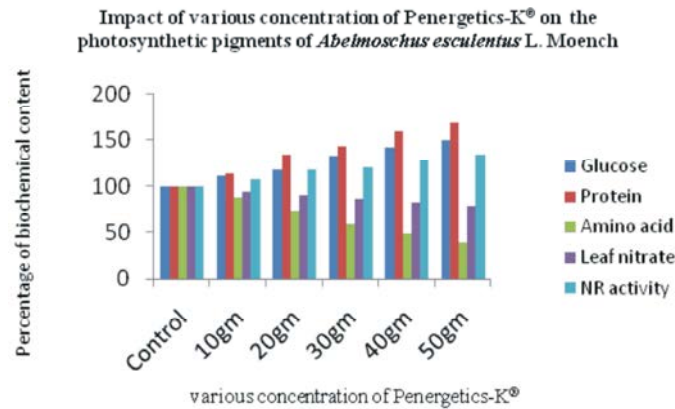


Fig. 3:

Table 1: Impact of various concentration of Penegetics-K® on growth parameters of *Abelmoschus esculentus* L. Moench.

S.No.	Parameter	Control	10%	20%	30%	40%	50%
1.	Shoot Length	4.2 ± 0.072(100)	4.7 ± 0.075(112)	5.4 ± 0.094(129)	5.8 ± 0.069(138)	6.2 ± 0.098(148)	6.7 ± 0.071(160)
2.	Root Length	21.4 ± 0.118(100)	22.4 ± 0.065(105)	24.5 ± 0.118(114)	25.5 ± 0.069(119)	26.3 ± 0.118(123)	27.6 ± 0.118(129)
3.	Fresh Weight	1.36 ± 0.011(100)	1.55 ± 0.014(114)	1.63 ± 0.009(120)	1.74 ± 0.016(128)	1.86 ± 0.012(137)	1.98 ± 0.010(146)
4.	Dry Weight	0.165 ± 0.001(100)	0.174 ± 0.001(105)	0.184 ± 0.007(112)	0.192 ± 0.009(116)	0.197 ± 0.041(119)	0.226 ± 0.027(137)

± Standard error values within the parenthesis indicate relative percentage compared with control.

Table 2: Impact of various concentration of Penegetics-K® on growth parameters of *Abelmoschus esculentus* L. Moench

S.No	Parameters	Control	10%	20%	30%	40%	50%
1.	Total chlorophyll (mg/gLFW)	4.85 ± 0.011 (100)	5.122 ± 0.011 (108)	5.94 ± 0.011 (122)	6.43 ± 0.010 (133)	7.54 ± 0.013 (155)	8.03 ± 0.019 (166)
2.	Carotenoids (mg/gLFW)	1.155 ± 0.001 (100)	1.393 ± 0.007 (121)	1.584 ± 0.013 (137)	1.722 ± 0.009 (149)	1.874 ± 0.005 (162)	1.987 ± 0.002 (172)
3.	Anthocyanin (mg/gLFW)	2.061 ± 0.001 (100)	2.081 ± 0.006 (101)	1.722 ± 0.009 (105)	2.33 ± 0.002 (113)	2.38 ± 0.111 (115)	2.45 ± 0.008 (119)

± Standard error values within the parenthesis indicate relative percentage compared with control

Table 3: Impact of various concentration of Penegetics-K® on biochemical characteristics of *Abelmoschus esculentus* L. Moench

S.No.	Parameters	Control	10%	20%	30%	40%	50%
1.	Total sugar (mg/g LFW)	48.3±0.0019(100)	53.4±0.0001(111)	56.4±0.0016(117)	64.4±0.0016(133)	69.3±0.0014(143)	72.5±0.0012(150)
2.	Total soluble protein (mg/g LFW)	6.528±0.0011(100)	7.44±0.0013(114)	8.752±0.0018(134)	9.376±0.0012(144)	10.464±0.015(160)	10.992±0.009(168)
3.	Amino acid (µMole/g LFW)	2.775±0.0015(100)	2.437±0.001(88)	2.025±0.0019(73)	1.65±0.0018(59)	1.35±0.0011(49)	1.087±0.0013(39)
4.	Leaf nitrate (mg/g LFW)	58.666±0.009(100)	55.0±0.011(94)	52.66±0.0009(90)	50.66±0.0007(86)	48.33±0.014(82)	45.66±0.0017(78)
5.	NR activity (µMole/g LFW)	24.16±0.0017(100)	25.83±0.001(107)	28.16±0.004(117)	29.0±0.0007(120)	30.83±0.0016(128)	32.5±0.0014(135)

± Standard error values within the parenthesis indicate relative percentage compared with control.

Application of growth promoter especially Penegetics-K® resulted in significant increase in chlorophyll content of *Abelmoschus esculentus* (Table 2 & Fig. 2). Similar to application of recommended doses of NPK fertilizers, cow dung has much significantly increased the chlorophyll and protein contents of mulberry leaves [11]. Similar promotory effect has given by Penegetics-K® in the experimental plants by increasing

the photosynthetic pigments. Photosynthetic pigments are also responsible for increase in all the biochemical parameters as the photosynthesis in the primary reaction taking place in green plants. An observed increase in NRA activity is correlated with decline in leaf nitrate content. An increase in free amino acid content in parallel with observed increase in protein content in all the experimental plants were also noticed (Table 3 & Fig. 3).

Thus the Penegetics-K[®] has a promotory effect on all the parameters which in turn will reflect the yield, proving the fertilizing effect of Penegetics-K[®].

CONCLUSION

In general overall the Penegetics-K[®] has a promotory effect on all the parameters which in turn will reflect the yield on the analysed, proving the fertilizing effect of Penegetics-K[®].

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