



Research Article

A comparative study of the effect of fish amino acid fertilizer and egg amino acid fertilizer on growth of *Amaranthus* species

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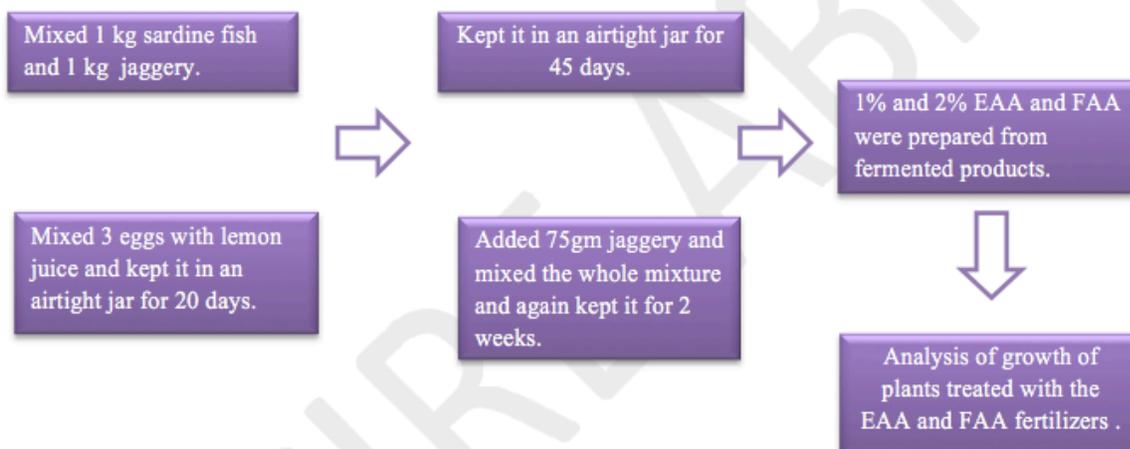
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Objective: To study the effect of two fertilizers fish amino acid fertilizer (FAA) and egg amino acid fertilizer (EAA) for plant growth and to recommend an effective fish waste management from houses and shops.

Methodology:



The duration taken for the research: 07 months

Conclusion: The application of FAA and EAA fertilizers were found to be effective in plant growth. 1% FAA and 2% EAA are the optimum concentration for better growth of plants. FAA fertilizer showed better efficiency than EAA fertilizer.

Applicable Industries/Sectors: Agriculture and, waste management.

Expected outcome: Implementation of this eco-friendly idea may minimize the harmful effects caused by synthetic or chemical fertilizers.

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Abstract

The present investigation was conducted to comparatively study the effects of two organic fertilizers, on the growth of *Amaranthus* species. For this study, two organic fertilizers FAA and EAA were selected and separately treated on *Amaranthus* species at two different concentrations (1%, and 2%) at particular intervals of time, while control plants were treated with water. Growth of the plants was analyzed, and data were collected. 1% FAA fertilizer and 2% EAA fertilizer are found to be the optimum concentration for growth of *Amaranthus* sp. When both the fertilizers are compared, the FAA is found to be more effective than EAA.

Keywords: FAA, Fish amino acid fertilizer, EAA, Egg amino acid fertilizer, Biofertilizer.

Introduction

Fertilizer is any substance used to add nutrients to the soil to promote soil fertility, and thereby increases plant growth. Synthetic-chemical fertilizers can upset the natural ecosystem, so it is better to switch on to organic fertilizers. Organic fertilizers are those derived from animal matter, animal excreta, vegetable matter and other natural sources. When compared to chemical fertilizers, organic manure has multiple benefits such as increased soil nutrient availability due to better soil microbial activity, which encourages the decomposition process, thereby improves soil structure. Moreover, they are eco-friendly. The present study compares two organic fertilizers -FAA fertilizer and EAA fertilizer. FAA fertilizer is produced by fermenting fresh fish by-products (bones, head, skin and other tankage parts) with brown sugar. Fish amino acid includes amino acids like Alanine, Arginine, Cysteine, Glutamine, and Glycine. (Li Peng, 2008). Fish emulsion has been documented to promote seedling growth (Murray and Anderson 2004), fruiting and microbe action in the soil. EAA fertilizer is produced by fermenting whole egg with brown sugar and lemon juice. Egg emulsion has been documented to improve chlorophyll pigment, thus promoting photosynthesis, growth and crop yield (Alagesan *et al.*, 2009) and eggshell and membrane contain high levels of calcium which helps to reduce blossom end root, soil p^H (Madhavi Gaonkar *et al.*, 2016). Egg amino acid contains Alanine, Isoleucine, Arginine, Leucine, Serine, Threonine, Lysine, and Tryptophan.

Materials and Methodology

For the preparation of FAA fertilizer, 1 kg of chopped fish and 1 kg jaggery were mixed and kept it in an airtight jar for 45 days in a cool, dry place. The jar was opened at regular intervals to allow some air to get inside and for the escape of the gas that is being produced during fermentation. The fermented extract was filtered after 45 days and preserved it in glass or plastic jar and stored it in a cool dark place. 1 % and 2% FAA were prepared by mixing 1 mL and 2 mL of FAA fertilizer with 100 mL water respectively.

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For the preparation of EAA fertilizer, three eggs were taken in a glass or plastic jar and added an adequate amount of lemon juice so that the eggs remain immersed in it. It was kept for 20 days in a cool, dry place away from sunlight and rain. After 20 days, when the egg appeared as a rubber ball, the eggs, lemon juice and 75gm jaggery were mixed thoroughly. Kept it in an airtight jar for two weeks in a cool, and dry place. After two weeks, the fermented product was filtered and preserved in an airtight jar and stored in a cool, and dry place. 1 % and 2% EAA were prepared by mixing 1 mL and 2 mL of EAA fertilizer with 100 mL water respectively. Three plants of *Amaranthus* sp. with same height were selected and treated with fertilizer and water at regular intervals of 2 days in a grow bag. Observations of parameters such as the height of the plant and length of the leaves of both FAA and EAA treated plants were noted down at regular intervals.

Results and Discussions

In the first week of treatment with the 1% FAA, the height of the plant was 12.2 cm, and the length of the leaf was 4.1 cm. In the fourth week, the height of the plant was increased to 15.6 cm, and the length of the leaf was found to be 5.5 cm (Figure 1). The results obtained after the treatment of the test plants with FAA fertilizer is given in Figure 3 and Figure 4.

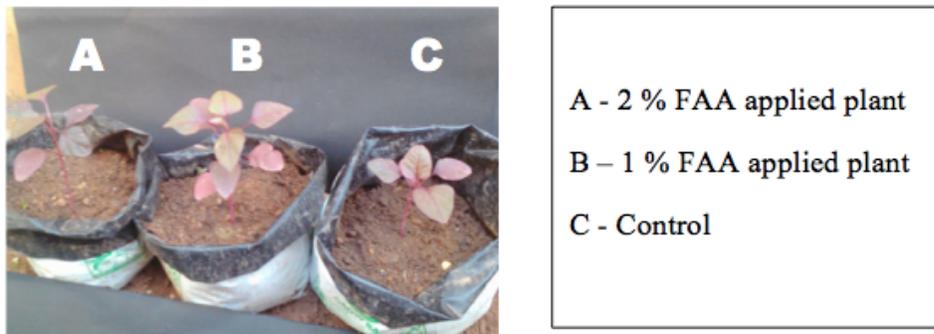


Figure 1: The plants treated with various concentrations of FAA

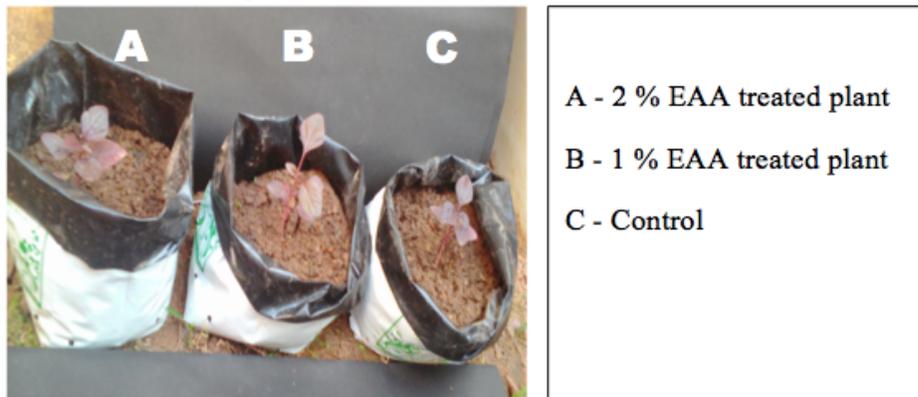


Figure 2: The plants treated with various concentrations of EAA

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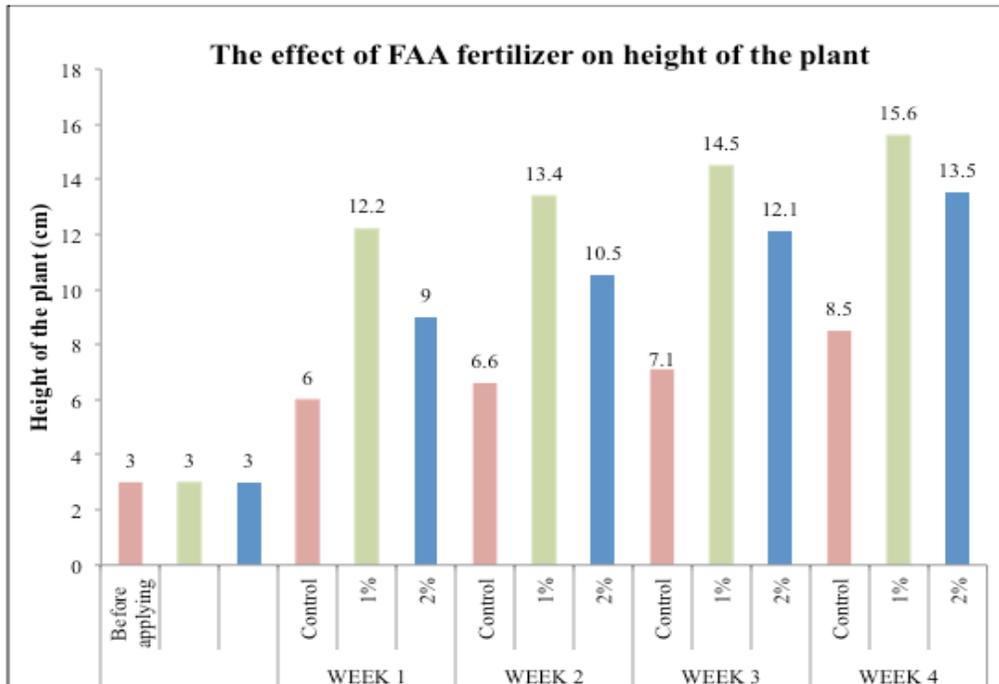


Figure 3: Effect of FAA fertilizer on the height of *Amaranthus* sp.

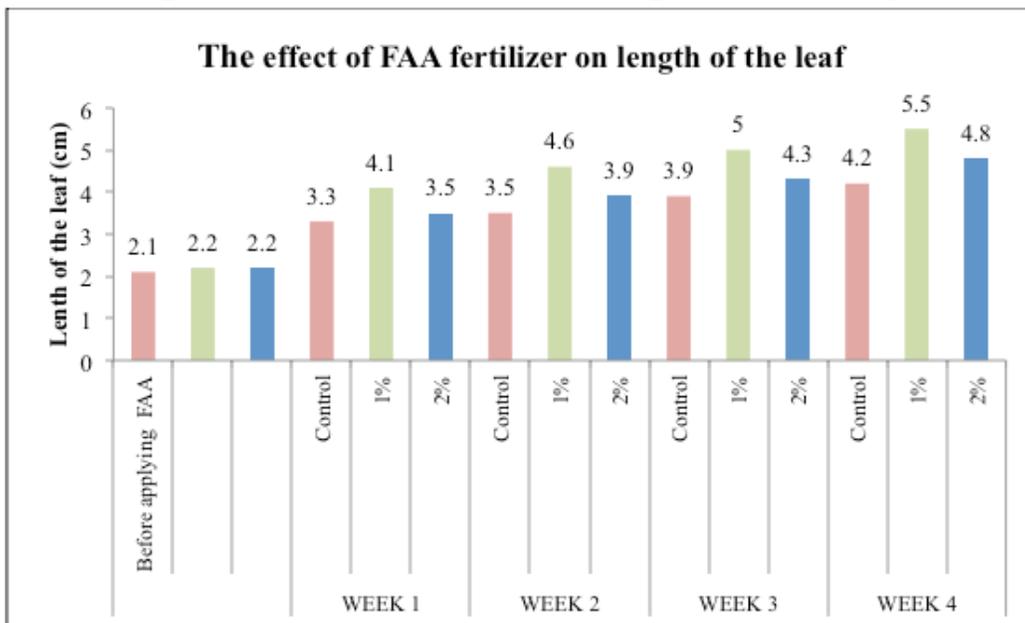


Figure 4: Effect of FAA fertilizer on length of leaves in *Amaranthus* sp.

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The height of the plant was 5.5 cm and length of the leaf was 3.5 cm for of 2 % EAA treated plants and in the fourth-week height of the plant and length of the leaf were 7.8 cm and 4.8 cm respectively. Thus we could see a gradual increase in the growth of the plant (Figure 2). The results obtained after the treatment of the test plants with FAA fertilizer is tabulated in Figure 5 and Figure 6.

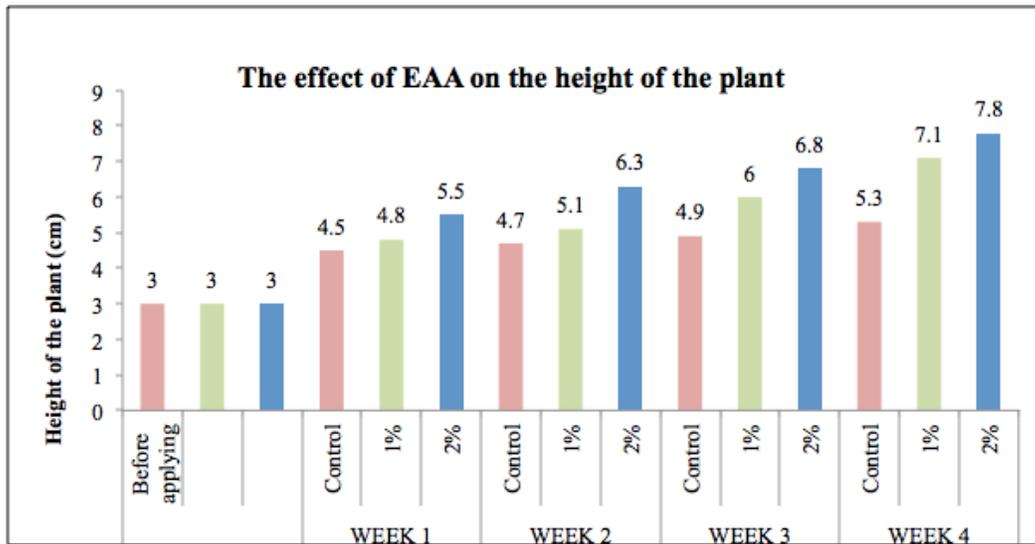


Figure 5: Effect of EAA fertilizer on the height of *Amaranthus* sp.

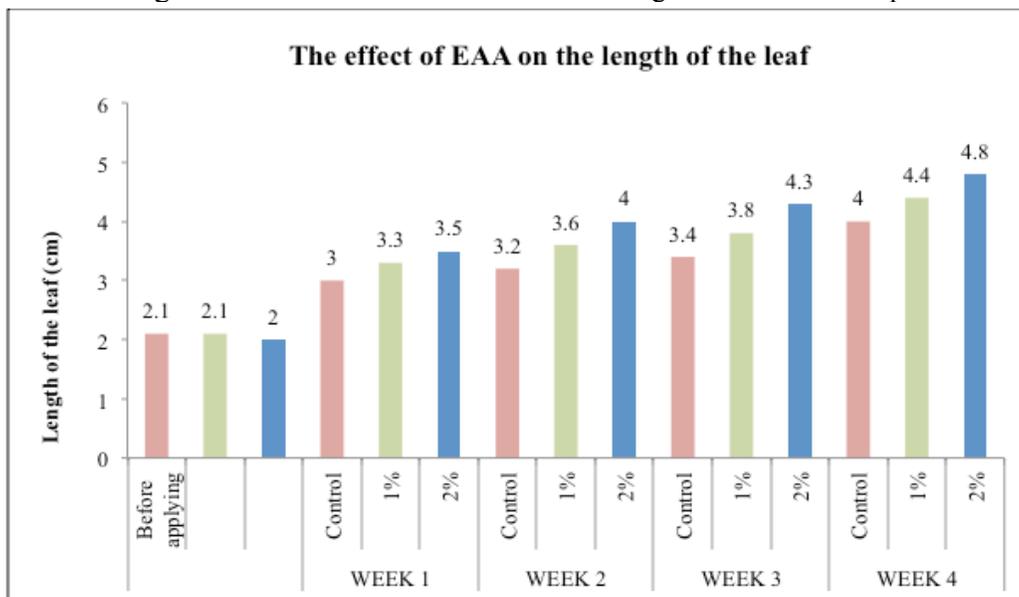


Figure 6: Effect of EAA fertilizer on length of leaves in *Amaranthus* sp.

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Comparative study of fish and egg amino acid fertilizers on the growth of *Amaranthus* species 1% FAA was more effective (Figure 7).

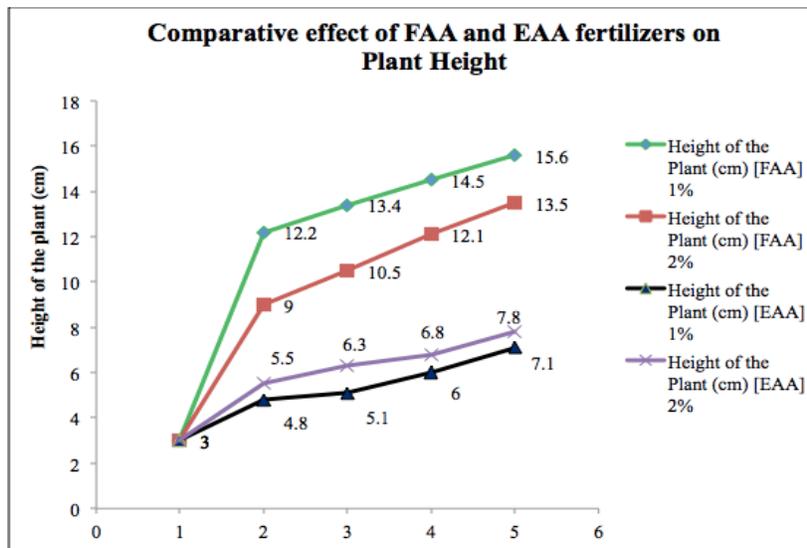


Figure 7: Comparative effect of the FAA and EAA on the height of the plant

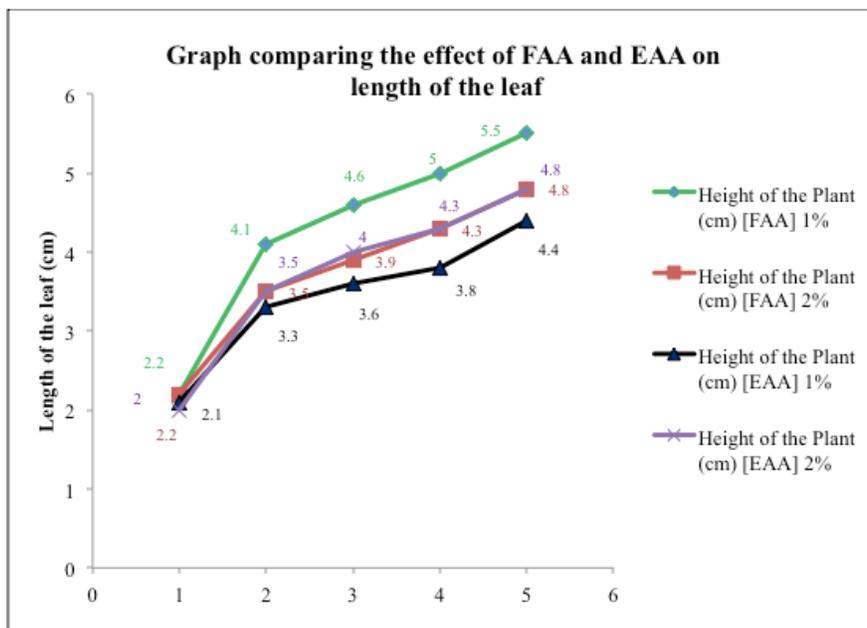


Figure 8: Comparative effect of the FAA and EAA on length of the leaves in *Amaranthus* sp.

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Higher growth was observed in the FAA than EAA treated plants. Even though EAA showed lower growth promotion than FAA, both of them are good organic fertilizers, and they can reduce the adverse effect caused by the chemical fertilizers and also increases productivity and growth.

Conclusion

In this work a comparative study of FAA fertilizer and EAA fertilizer on growth of *Amarantus* sp. was done and found that they could effectively support plant growth. The use of organic fertilizers such as EAA or FAA might have associated with the soil microbes, which supported the slow release of nutrients to plants. Even though they showed a difference in the effect on the growth of the plant, both FAA and EAA are found to be having a promising role in soil fertility enhancements.

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