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A preliminary study on the effects of gliricidia leaf extract on growth performances of tomato (*Lycopersicon esculentum*)

W.G.D. Lakmini, S.T.J. Rupika, P.E.Kaliadasa

Department of Crop Science, Faculty of Agriculture, University of Ruhuna, Mapalana, Kamburupitiya.

***Correspondence**: lakmini077@yahoo.com*

Abstract. The suitability of gliricidia (*Gliricidia sepium*) leaf extract to replace 100%, 75 %, 50 % and 25 % of Albert solution in growth of tomato (var. Thilina) was tested. The research was conducted under the protected plant house conditions at Faculty of Agriculture, University of Ruhuna. Polybags filled with the medium of 1:1 coir dust and sand and the solutions prepared by mixing different composition of gliricidia leaf extract and Albert solution were used for the experiment. 100 g ground gliricidia leaves were mixed in 1 L of water and filtered to prepare nutrient solutions. Growth performances of plants were recorded 12 weeks post treatments. Significantly ($P<0.05$) lower plant height was observed in plants treated only with gliricidia leaf extract whereas, significantly higher leaf number was observed in plants treated only with Albert solution (control). Performance of plant growth in respect to time taken for flowering also showed significant differences among treatments where, plants in control took shortest time but the time gap was only 6 days. Plants treated with 25% gliricidia extract and 75% Albert solution showed significantly higher yield. According to these results it could be concluded that the growth performances of tomato are reduced with increasing level of gliricidia leaf extract but with considering the yield gliricidia leaf extract could replace about 25% of Albert solution giving an additional benefits to reduce cost of production.

Keywords. Growth performances, gliricidia leaf extract and tomato

Introduction

Protected agriculture is the modification of the natural environment to achieve optimum plant growth. Modification can be made to both aerial and root environments to increase the crop yield, extending the growing season, protect form the hazardous and permit plant growth during the any time of the year (Molter and

Jensen, 1995). Albert solution is the common nutrient solution used for all growing crops in protective agriculture. But the cost of production is higher due to higher prices of the Albert solution. *Gliricidia sepium* is a leguminous tree and used in many tropical and sub-tropical countries as live fencing. The foliage of *Gliricidia sepium* is used for green manuring and to produce other kind of organic manure due to its higher nutritional composition (Gunasena, 1994). Number of research have been conducted on the antifungal and antimicrobial properties of gliricidia extracts and those researches proved that gliricidia extracts can inhibit the growth of some fungi, bacteria and nematodes (Ganesan, 1994). Thus, by using gliricidia leaf extract as a nutrient solution can limit plant disease and pest attacks as well. Therefore, the objective of this research was to evaluate the suitability of Gliricidia leaf extract to replace Albert solution.

Materials and Methods

Tomato variety "Thilina" was used as the planting material. Seeds were sown in nursery medium of coir dust in plastic trays and three weeks old seedlings were transplanted in polybags filled with medium of 1:1 coir dust and sand. They were placed in a plant house.

The Gliricidia leaves were collected form the plants grown naturally in Faculty of Agriculture, University of Ruhuna, Mapalana. Leaves were ground in a laboratory mill mixing 1 L of water to 100 g of leaves. Filtered solutions of the leaf extract were used to prepare different nutrient solutions with different composition of Albert solution. Albert solution was prepared according to the manufactures instructions. The five different nutrient solutions tested in this experiment were as follows,

T1 -Albert solution	100% (Control)		
T2 -Albert solution	75 %	+ Gliricidia leaf extract	25 %
T3 -Albert solution	50 %	+ Gliricidia leaf extract	50 %
T4 -Albert solution	25 %	+ Gliricidia leaf extract	75 %
T5 -Gliricidia leaf extract		100 %	

Treatment combinations were laid in a CRD with four replicates.

Plant height and number of leaves were measured once in two days during early stages and interval of counting number of leaves was increased during flowering stage. Time taken for flowering and final yield was also measured.

Analysis of variance was performed using PROC ANOVA with SAS statistical software. Test of significance of the difference between treatment means was done using DMRT to identify the best medium out of five treatments been evaluated.

Results and Discussion

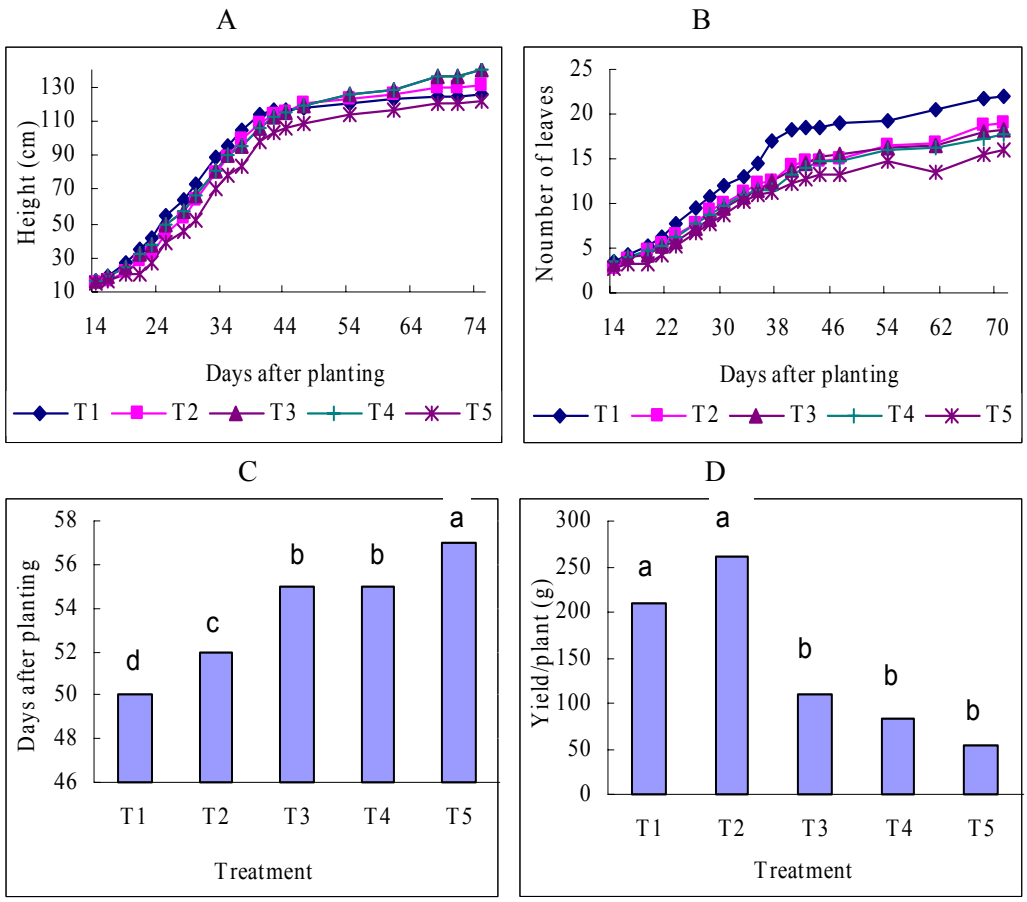

Figure 1. Effect of different composition of Gliricidia leaf extract on (A) plant height, (B) Number of leaves, (C) Time taken for flowering and (D) Final yield.

There was no significant difference among treatments in plant height until 19 days after transplanting (Fig. 1A). There after treatment 5 showed significantly lower plant height than did other four treatments indicating there is no significant effect on plant height by replacing Albert solution with Gliricidia leaf extract.

Number of leaves per plant was more or less similar in all treatments during early stage of transplanting but after three weeks plants in control showed significantly higher number of leaves (Fig. 1B). There was no statistically significant difference among four other treatments showing the ability to use gliricidia leaf extract.

Significant difference was observed in time taken to flowering (Fig. 1C). Plants treated only with Gliricidia leaf extract showed delay in flowering and plants treated only with Albert solution showed early flowering. Whereas, among treatment 3 and 4 there were no statistically significant difference.

Yield is the most important parameter of any nutrient trial. There was a statistically significant difference in treatment 1 and 2 than other three treatments (Fig. 1D). Significantly higher yield was observed in plants grown in control (200g/plt) and the plants treated with 25% gliricidia extract and 75% Albert solution (250g/plt). But these figures are comparatively lower than the total yield obtained from farmers who use only Albert solution under normal environmental conditions and also the size of fruits was less. These changes might be the results of high temperature (42 ^{o}C) in the plant house during the experimental period.

Conclusion

According to the results obtained, it could be concluded that the growth performances of tomato reduce with increasing composition of Gliricidia leaf extract as nutrient solution Therefore, Gliricidia leaf extract alone can not be used as a nutrient solution for growing tomato. But with considering the yield Albert solution can be replaced approximately by 25 % of Gliricidia leaf extract and also it would be more economical. Moreover, further research should be conducted on nutrient analysis of tomato grown under these nutrient solutions before come in to a final conclusion.

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