STUDY THE TILLERING HABIT OF FINGER MILLET (Elusine coracana L.Gaertn) AT DIFFERENT LEVELS OF NITROGEN

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Introduction

Finger millet (*Eleusine coracana* L.Gaertn) is one of the important highly nutritive grain species that currently support the world's food supplies. Farmers in many parts of the country are now rapidly moving towards cultivating finger millet in their lands due to high demand in local as well as overseas market (Annual report *FCRDI*, 2006). Finger millet is traditionally grown in the dry zone of Sri Lanka during *maha* season under rainfed conditions and farmers obtain substantial grain yields without application of fertilizer. As a result of continuous cultivation on the same land, soil fertility and the grain yields have been decreasing (Annual report *FCRDI*, 2006). Nitrogen is a very important nutrient for finger millet plant and it seems to have the quickest and most pronounced effect for tillering (Rego and Patra, 1993). It has been reported that crops response strongly to Nitrogen both in terms of growth and in terms of Nitrogen concentration in the dry matter produced (Kresge and Younts, 1962). However, currently recommended dosage of nitrogen fertilizer (farmers are still using the fertilizer recommendation which was introduced in the year 1997) may not be adequate to obtain potential yield from recently introduced finger millet varieties. In the light of this situation, the importance was felt to investigate the tillering habit of finger millet at different levels of Nitrogen.

Objectives of the Study

To study the tillering habit of finger millet (*Elusine coracana* L.) at different levels of Nitrogen, and its impact on crop growth and yield by a field experiment.

Methodology

This study was conducted as a field experiment at Field Crops Research and Development Institute, Mahailluppallama (located in the agro-ecological zone $DL_{1)}$ in the year 2007/2008 *Maha* season. The experiment was laid out as a Randomize Complete Block Design (RCBD) with 4 replicates. Number of treatments was 4 and number of plants per treatment was 80. Planting spacing adopted was 15 cm x 15 cm. A recently-introduced, widely grown, high yielding finger millet variety named "Oshadha" was selected for this study. Nitrogen fertilizer was applied at different rates while Phosphorous and Potassium fertilizers were applied at a same rate to all treatments according to the current department recommendations. Nitrogen fertilizer was applied in different levels as follows,

T_1 – Urea 100 kg/ha,TSP 50 kg/ha, MOP 50 kg/ha and Cowdung 30 kg/ha
T_2 – Urea 125 kg/ha, TSP 50 kg/ha, MOP 50 kg/ha and Cowdung 30 kg/ha (Present fertilizer recommendation of DOA,1997)
T_3 – Urea 150 kg/ha, TSP 50 kg/ha, MOP 50 kg/ha, and Cowdung 30 kg/ha
T_4 – Urea 175 kg/ha, TSP 50 kg/ha, MOP 50 kg/ha, and Cowdung 30 kg/ha

Data were tabulated and analyzed by using Analysis of variance (ANOVA) procedure of Statistical Analysis System (SAS). Duncan's New Multiple Range Test (DNMRT) was used to compare differences among the means at P=0.05.

Results and Findings

Data were analyzed by using Statistical Analysis System (SAS) according to the above mentioned combine category. According to the analyzed data, as shown in Table 1, it was reveals that the lowest R^2 value was in plant dry weight (0.397) but it was not significant (P>0.05).

Table 1. Results of the Analysis of variance (ANOVA) of growth and yield parameters of Finger millet

Variables	R^2 value	Coefficient of Variability (C.V)
Grain Yield	0.548	13.57
Plant Dry Weight	0.397	12.42
Plant Height	0.522	5.56
Spike Weight	0.544	11.14
Plant Fresh Weight	0.405	13.51

The findings given in Table 2 reveled that the Grain Yield, Productive tillers at 12WAP and Tillers at 12WAP were not significant (P>0.05). According to the Visual observations there was not much difference in Productive tillers as well (Plate 4.1, 4.2, 4.3 and 4.4).

Table 2. Results of the Regression Analysis of growth and yield parameters of Finger millet

Variables	R^2 value	Probability Value (P<0.05)
Grain Yield	23.7	0.513
Productive tillers(12WAP)	64.3	0.198
Tillers (12WAP)	53.21	0.113

Variation of the productive tillers at 10 and 12 weeks after planting is given in figure 1. Among four treatments tested, the mean productive tillers/plant higher in treatment four and lower in treatment one.

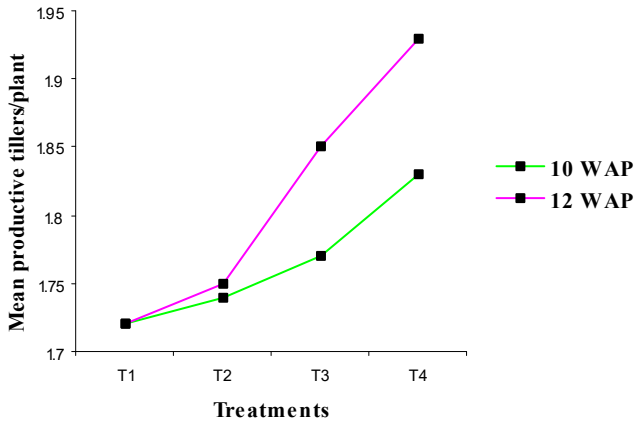

Figure 1. Variation of mean productive tillers / plant at 10 and 12 WAP. Data presented for each treatment are the means of four replicates.

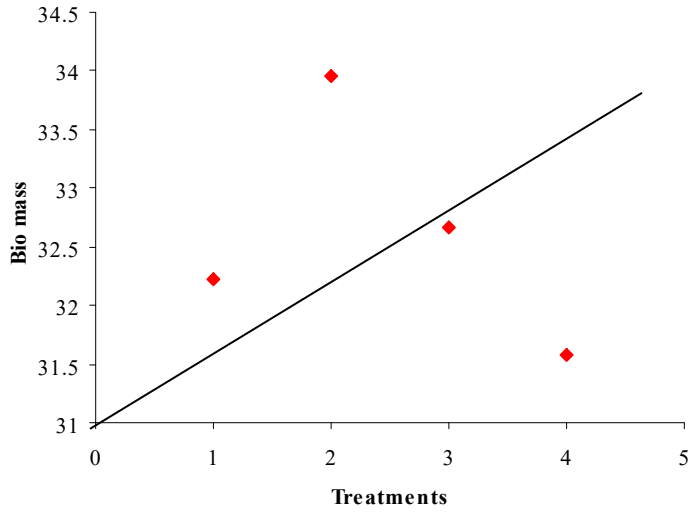

Figure 2. Scatter plot of mean Bio- mass. Data presented for each treatment are the means of four replicates

According to the Figure 2 mean Bio-mass values were scattered everywhere in the plot area. So, there was no strong positive correlation between the treatments and the bio-mass. Results obtained from the mean weights of spikes and grains at harvesting as shows in figure 3, showed positive relationship between spike weight and grain yields.

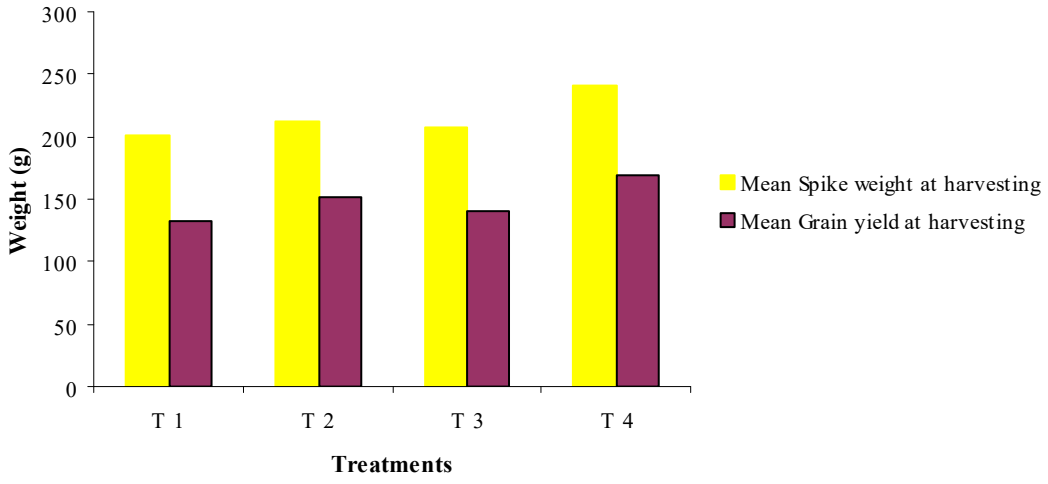

Figure 3. Mean Spike weight and Grain yield at harvesting. Data presented for each treatment are the means of four replicates

When correlation analysis was done for yield and growth parameters Spike weight had a highly significant (P<0.001) positive correlation with Grain yield (Table 3). Plant fresh weight (PFW) was not significant (P=0.05) with Grain yield (GY) and Plant height (PH). Plant fresh weight (PFW) was significant (P= 0.05) with Plant dry weight (PDW) and Spike weight (SW).Grain yield (GY) showed highly significant correlation (P= 0.001) with plant dry weight (PDW) and Spike weight (SW). Grain yield (GY) was not significant (P=0.05) with Plant height (PH). Plant dry weight (PDW) had moderately significant correlation (P=0.01) with plant height (PH) and spike weight (SW).

Table 3. Linear correlation coefficient between Plant fresh weight (PFW), Grain yield (GY), Plant dry weight (PDW), Plant height (PH) and Spike Weight (SW) for the overall data set.

	PFW	GY	PDW	PH	SW
PFW	-	0.48^{ns}	0.53^{*}	0.49^{ns}	0.50^{*}
GY		-	0.83^{***}	0.47^{ns}	0.89^{***}
PDW			-	0.63^{**}	0.79^{**}
PH				-	0.28^{ns}

*Note: ns, non-significant at P=0.05; *Significant at P=0.05; **Significant at P=0.01; ***Significant at P=0.001.*

The data as shown in figure 4 reveals that the productive tillers at 12WAP had no correlation with the Nitrogen fertilizer levels. The values of Productive tillers were randomly distributed in the scatter plot. So, there was no positive trend for increasing Nitrogen fertilizers levels (Figure 4).

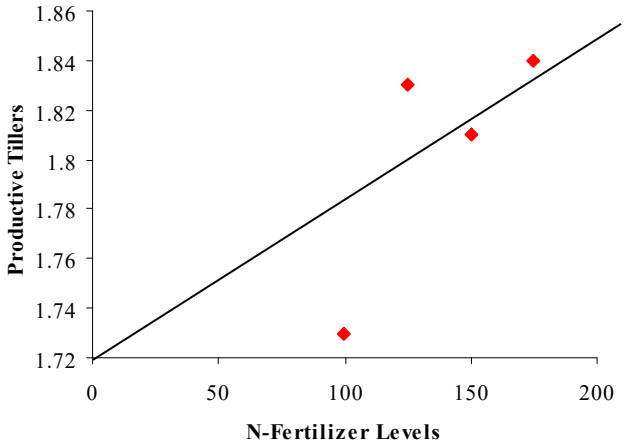

Figure 4. Scatter plot of productive tillers (12WAP) vs. different nitrogen fertilizer levels.

Study findings revealed that there is no correlation between Nitrogen fertilizer levels and tillering habit of Finger millet plants. On the other hand, the productive tillers per plant and grain yield had no positive response of adding extra amount nitrogen fertilizer from the department recommendation (Treatments 3 and 4) and there were no effect of adding Nitrogen fertilizer to spike weight or bio mass too.

Conclusions and Recommendations

The results of this study clearly showed that, there was no significant correlation ($P>0.05$) between Nitrogen fertilizer levels and growth and yield parameters of finger millet. Findings of the study revealed that increasing nitrogen fertilizer levels recommended by the department had no influence over the growth or the yield of recently introduced high yielding finger millet varieties. Therefore, this study reveals that the extensive use of nitrogen fertilizer beyond the recommended dosage in 1997 (DOA) could not be beneficial as commonly believed by the farmers, despite leading to increase cost of production, contamination of ground water and soil environment.

References

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