

Effects of Bio-inoculants and fertilizers on growth of *Moringa oleifera* PKM1 variety

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ABSTRACT

The concept of growth analysis has highly effective on the study of plant reaction in environmental condition. The determination of potential for the growth of plant will vary according to the environmental factors and nutrients application in form of fertilizer and bio-inoculants. The following study specifies the characterization of plant *Moringa oleifera* PKM1 variety by measurement of parameters like Relative Growth Rate (RGR), Leaf Area Ratio (LAR), Net Assimilation Rate (NAR), and Secondary Metabolites (Biomass).

Keywords: RGR, LAR, NAR, Biomass.

INTRODUCTION

Moringa oleifera (Horseradish tree) is the most cultivated species of a monogeneric family, Moringaceae native to the Sub-Himalayan tracks of India. Recently there is highly demand of some of the hybrid varieties of Moringa, especially variety PKM1 (South Indian origin) affecting the growth rate. The present study is to access the effect of different bio-inoculants and fertilizers on the growth and development of *Moringa oleifera* (PKM1) variety under green house condition as a part of rural livelihood support and also for the estimation of different growth parameters like Relative Growth Rate (RGR), Leaf Area Ratio(LAR), Net Assimilation Rate(NAR), and Secondary Metabolites(Biomass).

MATERIALS AND METHODS

Moringa oleifera PKM1 variety was used as the sample, the experimental set up was done inside the Green house maintaining the temperature 27-28°C and water was sprayed inside it. The experimental setup contains 2 trays, each of 48 small pots from the total of 96. The pots were filled

with sterilized soil and sand through the entire surface area of each pot. Then the row marked as treatments and columns as replication. There were 12 treatments including control containing 8 replications each. Different fertilizers were added to the respective treatments one by one as per the quantity fixed above. There after water was sprayed & then the seeds sowing inside pot i.e. one seed per pot.

Table 1

Treatments	Fertilizers
Control	Without any fertilizer treatment
T1	Urea (N) Each pot contains 5 ml
T2	S.S.P (P) Each pot contains 5ml
T3	Potash (K) Each pot contains 5ml
T4	Shymla 26-26-10 Each pot contains 5ml
T5	Bio-organic Annapurna 1gm/pot
T6	Bio-organic Garden samrat 1gm/pot
T7	Bio-organic Biopower 1gm/pot
T8	Fungi 5ml/pot
T9	Fungi 5ml+S.S.P 5ml/pot
T10	Fungi 5ml+S.S.P 5ml+ Annapurna 1gm /pot
T11	Fungi 5ml+ Annapurna 1gm /pot

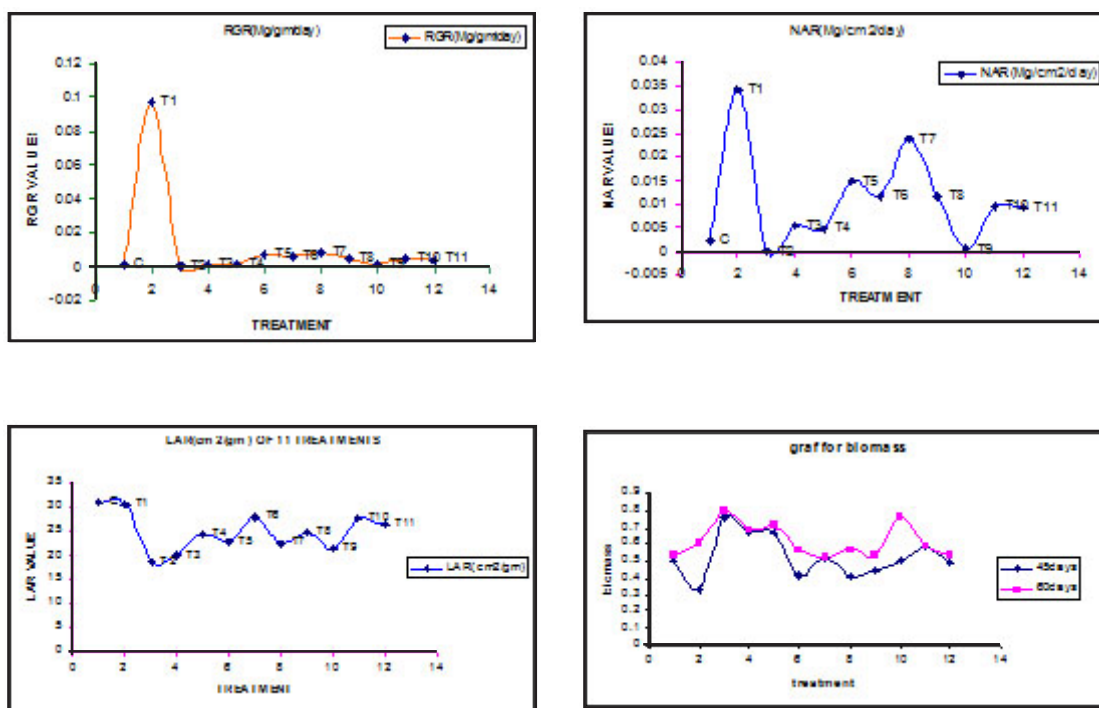
Table 2 : (H- Height in cm, L- No. of leaves)

Observation		Average Height and No. of Leaves		
		15 Days	30 Days	45 Days
Control	H	12.35cm	20.44cm	27.97cm
	L	28.85	30.71	45.37
T1	H	10.93cm	19.06cm	27.06cm
	L	31.66	41.33	54.33
T2	H	15.02cm	24.9cm	36.65cm
	L	27	31	38.5
T3	H	9.25cm	21.28cm	30.18cm
	L	19.75	25	35.12
T4	H	10.22cm	19.83cm	28.93cm
	L	20.8	32.33	43
T5	H	9.41cm	16.64cm	38.8cm
	L	26.33	35.28	46.42
T6	H	8.9cm	14.71cm	27.27cm
	L	19	28.85	40.28
T7	H	10cm	19.68cm	30.76cm
	L	25	34.2	46.8
T8	H	13.88cm	22.78cm	32.65cm
	L	23.16	34.16	46.83
T9	H	10.92cm	24.04cm	34.74cm
	L	18.4	20.2	39.16
T10	H	10.2cm	19.83cm	30.88cm
	L	18	31.25	36.62
T11	H	8.5cm	13.68cm	25.12cm
	L	24.85	32.5	44.25

Table 3

Treatment	RGR(Mg/gm/day)	NAR(Mg/cm ² /day)	LAR(cm ² /gm)
C	0.0013	0.0023	30.885
T1	0.0097	0.0343	30.555
T2	0.0002	0.00017	18.678
T3	0.0019	0.0056	19.929
T4	0.002	0.0049	24.476
T5	0.007	0.0149	22.671
T6	0.0066	0.0116	27.926
T7	0.0085	0.0238	22.429
T8	0.0046	0.0117	24.612
T9	0.0022	0.00061	21.284
T10	0.0046	0.00943	27.373
T11	0.0039	0.00924	26.089

(Relative Growth Rate (RGR), Leaf Area Ratio (LAR), Net Assimilation Rate (NAR), and Secondary Metabolites (Biomass).)



**Graph (Rgr, Nar, Lar & Biomass of 11 Treatments)
Observation of Biomass Taken at 45 & 60 Days**

The day of sowing was count 0 day in observation. After 6 days it started to germinate with minimum height of 1c.m. The observation was taken in 15, 30 & 45 days of germination (Table 2).

RESULT AND DISCUSSION

Moringa oleifera PKM1 variety shows great response to different fertilizers. As from the above observation it conclude that from the RGR analysis treatment no-1 with urea shows maximum RGR value i.e. 0.0097mg/gm/day, NAR value i.e.. 0.0343mg/cm2/day & LAR value i.e. 30.555cm2/gm. Biomass was estimated and was found better in treatment-2 in 45 & 60 days with SSP i.e. 0.765gm & 0.805gm respectively. So it concludes that RGR treatment T1 with urea is found beneficial over other application of Bio inoculants and fertilizers. This may be attributed to the uses of more Nitrogen by the plant.

Table 4

Treatments	Dry biomass	
	At 45 days	At 60 days
Control	.505	.532
T1	.333	.609
T2	.765	.805
T3	.674	.688
T4	.662	.712
T5	.412	.567
T6	.520	.519
T7	.402	.568
T8	.444	.533
T9	.502	.762
T10	.580	.592
T11	.489	.538

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