

Effect of organic and inorganic source of nutrient with irrigation scheduling on growth performance of *Jatropha curcas* (L.) cuttings

I. ALAM and M.S. ALI

Department of Forestry, Rajendra Agricultural University, Pusa, Samastipur - 484 125 (India)

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ABSTRACT

An experiment entitled "Effect of organic and inorganic source of nutrient with irrigation scheduling on growth performance of *Jatropha curcas* (L.) cuttings" was carried out during Feb 2007 at forestry nursery at Rajendra Agricultural University, Pusa, Samastipur, Bihar to find out best nutrient resource for *Jatropha* cutting at nursery stage. The experiment was laid out on nine nursery bed replicated thrice with nine CPTs RAU-P-Jat-1 and Nine treatment viz. T₁-Control, T₂-DAP(200gm)+MOP(100gm), T₃-SSP(200gm)+MOP(100gm), T₄-Vermiwash (10lit/plot), T₅-Vermicompost(10kg/plot), T₆- FYM (10Kg/plot), T₇-FYM (5Kg)+Vermiwash (5lit/plot), T₈-FYM (5Kg)+Vermicompost(5Kg)/plot, T₉-Vermicompost (5Kg)+Vermiwash(5lit)/plot, Viz (I₁)-3days, (I₂)-Weekly interval and I₃-Fortnightly interval. The soil of experimental plot was low in NPK content. Available Nitrogen -225 (kg/ha), available P₂O₅-15(Kg/ha), Available K₂O-120(Kg/ha). The data of plant height, branch length and collar diameter and volume index were taken. The mean value of the parameter reveals that maximum plant height, branch length, collar diameter and volume index were obtained in case of T₂ followed by T₄, T₉, T₇, T₅, T₃, T₈, T₆ and T₁.

Key words: Organic, inorganic, nutrients, growth performance, *Jatropha curcas* (L) cutting.

INTRODUCTION

Jatropha curcas L. (Euphorbiaceae) is native of Mexico but now a days huge cultivation started for Biomass production in Asia and Africa. It is introduced in India especially for Bio-fueled production. As it come well on degraded land, gives two harvest of seed in year, once planted gives economic yield near about 20 years which ultimately decrease the cost of cultivation year after year. So it need initial care at nursery stage. As we are growing his crop for economic purpose so it is very nursery to improve its biomass by applying some organic and inorganic source of fertilizers, which is easily available or can be prepared by local farmer, ultimately it improves the soil health, economic yields as well as economy of the farmer. The use of Judicious combination of organic and inorganic fertilizers sources is essential not only to maintain the soil health but also sustain productivity (Malewar

et al., 1998). Organic manures not only increase the yield but also improve physical, chemical and biological properties of soil that improve fertility, productivity water holding capacity of soil (Blane *et al.*, 1989). By considering the above point a trial was conducted at nursery stage of *Jatropha* cutting to study most efficient resource of organic and inorganic fertilizer on growth of the plant. Kato *et al.*, (1991) reported that the addition of FYM had a beneficial effect on growth characters and development of tree species.

MATERIAL AND METHODS

The experiment was conducted on nine nursery bed replicate thrice with nine treatments viz. T₁-Control, T₂-DAP(200gm)+MOP(100gm), T₃-SSP(200gm)+MOP(100gm), T₄-Vermiwash (10lit/plot), T₅- Vermicompost(10kg/plot), T₆- FYM (10Kg/plot), T₇-FYM (5Kg)+Vermiwash (5lit/plot),

T₈-FYM(5Kg)+Vermicompost(5Kg)/plot, T₉-Vermicompost (5Kg)+Vermiwash(5lit)/plot, with three irrigation scheduling Viz I₁-3days, interval (I₂)-Weekly interval and I₃-Fortnightly interval, nursery bed size was 2.5×1.25m² with spacing 30×30cm, each treatment was applied on single nursery bed, mixed well at upper 20cm of soil after 5 days of mixing, *Jatropha* cutting (RAU-P-Jat-1) 2.5cm in

length and 1.5-2 cm in thickness cutting were planted one third of cutting were buried and ¼ were left on top with wax coating on upper cutted end, all cutting were treated with 80/PPm of NAA with quick deep method. After planting all cutting were irrigated at once and there after irrigation interval 3 days gap weekly interval and fortnightly interval were maintained for each treatment.

Table 1: Plant height (cm)

Treatments	Irrigation interval	30DAP	60DAP	90DAP	Mean
T ₁ -Control	3 days gap	6.52	12.5	25.30	14.7
	Weekly interval	5.32	11.75	24.23	13.76
	Fortnightly	4.42	10.25	21.21	11.96
T ₂ -DAP(200gm) +MOP(100gm)	3 days gap	18.26	24.35	53.50	32.03
	Weekly interval	16.35	22.50	51.32	30.05
	Fortnightly	15.45	21.25	50.25	28.98
T ₃ -SSP(200gm) +MOP(100gm)	3 days gap	11.36	17.50	39.35	22.74
	Weekly interval	10.26	16.25	37.42	21.31
	Fortnightly	9.56	15.75	35.42	20.22
T ₄ -Vermiwash (10lit)	3 days gap	19.26	21.75	57.42	31.81
	Weekly interval	14.32	20.75	54.352	29.80
	Fortnightly	13.45	19.25	50.40	27.7
T ₅ - Vermicompost(10kg)	3 days gap	12.35	18.50	35.36	20.22
	Weekly interval	11.25	17.25	42.42	24.42
	Fortnightly	10.15	16.20	40.20	22.90
T ₆ - FYM (10Kg)	3 days gap	8.25	15.75	32.15	18.71
	Weekly interval	7.45	14.52	30.32	17.43
	Fortnightly	6.55	13.35	28.25	16.01
T ₇ -FYM (5Kg)+ Vermiwash (5lit.)	3 days gap	13.32	19.75	43.45	25.50
	Weekly interval	12.15	18.52	42.36	24.34
	Fortnightly	11.25	16.52	40.42	22.80
T ₈ -FYM(5Kg) +Vermicompost(5Kg)	3 days gap	14.35	20.25	49.15	27.91
	Weekly interval	13.15	18.25	46.32	26.33
	Fortnightly	12.25	18.32	42.25	24.28
T ₉ -Vermicompost (5Kg) +Vermiwash(10lit)	3days gap	14.35	20.25	49.15	27.91
	Weekly interval	13.15	19.52	46.32	26.33
	Fortnightly	12.25	18.35	42.25	24.48
Meax (X)		11.20	17.36	40.01	
SD		3.43	3.33	9.61	
CV		30.62	19.18	24.01	

Volume index was calculated as per formula given by manavalan (1990).

$$V1 = \text{Diameter} \times \text{height}$$

Observation of plant height, collar diameter and branch length were recorded at 30,60 and 90 days interval and their mean value were arrange in the table 1, 2 and 3. Volume index were calculated

after multiplying the diameter with plant height at different interval and data were arranged in the table 4 and their mean standard deviation and coefficient of variance were calculated.

Finding

On appraisal of mean data from Table 1, 2, 3 and 4 at different day's interval and three irrigation scheduling. The plant height, collar

Table 2: Collar diameter (cm)

Treatments	Irrigtaion interval	30DAP	60DAP	90DAP	Mean
T ₁ -Control	3 days gap	0.46	1.14	2.28	1.29
	Weekly interval	0.43	1.10	2.20	1.24
	Fortnightly	0.40	0.95	2.15	1.16
T ₂ -DAP(200gm) +MOP(100gm)	3 days gap	0.88	1.45	3.52	1.95
	Weekly interval	0.65	1.25	3.20	1.7
	Fortnightly	0.62	1.12	2.95	1.56
T ₃ -SSP(200gm) +MOP(100gm)	3 days gap	0.56	1.24	2.65	1.48
	Weekly interval	0.54	1.23	2.50	1.42
	Fortnightly	0.52	1.22	2.45	1.39
T ₄ -Vermiwash (10lit)	3 days gap	0.76	1.35	3.48	1.86
	Weekly interval	0.68	1.32	3.15	1.72
	Fortnightly	0.58	1.30	2.80	1.56
T ₅ - Vermicompost(10kg)	3 days gap	0.58	1.27	3.0	1.62
	Weekly interval	0.56	1.25	2.75	1.52
	Fortnightly	0.55	1.23	2.60	1.46
T ₆ - FMY (10Kg)	3 days gap	0.53	1.22	2.42	1.39
	Weekly interval	0.52	1.20	2.38	1.36
	Fortnightly	0.50	1.18	2.30	1.32
T ₇ -FYM (5Kg)+ Vermiwash (5lit.)	3 days gap	0.62	1.31	3.25	1.72
	Weekly interval	0.60	1.28	3.0	1.62
	Fortnightly	0.60	1.26	2.65	1.50
T ₈ -FYM(5Kg) +Vermicompost(5Kg)	3 days gap	0.54	1.25	2.50	1.43
	Weekly interval	0.53	1.23	2.42	1.39
	Fortnightly	0.52	1.20	2.35	1.36
T ₉ -Vermicompost (5Kg) +Vermiwash(10lit)	3days gap	0.65	1.32	3.35	1.77
	Weekly interval	0.64	1.30	3.0	1.65
	Fortnightly	0.63	1.28	2.75	1.55
Meax (X)		0.58	0.90	0.39	
SD		0.096	0.90	0.39	
CV		0.16	72.58	14.23	

diameter, branch length and volume index were maximum in the treatment. T₂ i.e. DAP+MOP (200gm+100gm/plot) followed by Vermiwash 10lit/plot (T₂), T₉-(Vermicompost + vermiwash), T₇-(FYM + vermiwash), T₅-(vermicompost), T₆-(SSP+MOP), T₈-(FYM+vermicompost), T₉ - FYM and control (T₁).

However three days interval of irrigation

was found more suitable which obtained maximum plant height, collar diameter, branch length and ultimately volume index of the plant.

In case of inorganic source of nutrient DAP-MOP combination gave better result than SSP+MOP, but in case of organic sources of nutrients vermiwash gave better result than any other sources and combination of source of nutrient.

Table 3: Branch length (cm)

Treatments	Irrigation interval	30DAP	60DAP	90DAP	Mean
T ₁ -Control	3 days gap	5.16	5.75	18.25	9.72
	Weekly interval	4.25	4.25	16.35	8.28
	Fortnightly	3.15	3.75	14.25	7.05
T ₂ -DAP(200gm) +MOP(100gm)	3 days gap	15.32	20.25	45.42	26.99
	Weekly interval	13.32	18.50	41.58	24.46
	Fortnightly	12.20	16.32	36.63	21.71
T ₃ -SSP(200gm) +MOP(100gm)	3 days gap	8.32	12.0	26.21	15.51
	Weekly interval	7.24	11.25	25.52	14.67
	Fortnightly	6.25	10.35	24.73	13.77
T ₄ -Vermiwash (10lit)	3 days gap	12.75	18.25	40.33	23.61
	Weekly interval	11.25	17.35	37.54	22.04
	Fortnightly	10.50	16.45	33.75	20.23
T ₅ - Vermicompost(10kg)	3 days gap	9.40	13.45	29.34	17.39
	Weekly interval	7.45	12.15	27.21	15.60
	Fortnightly	6.32	11.25	25.43	14.33
T ₆ - FYM (10Kg)	3 days gap	6.30	8.52	21.25	24.25
	Weekly interval	5.23	7.46	20.35	11.01
	Fortnightly	4.15	6.55	18.45	9.71
T ₇ -FYM (5Kg)+ Vermiwash (5lit.)	3 days gap	10.25	15.25	32.31	19.27
	Weekly interval	8.40	14.75	30.25	17.80
	Fortnightly	7.30	13.5	28.35	16.30
T ₈ -FYM(5Kg) +Vermicompost(5Kg)	3 days gap	7.25	10.75	24.25	14.08
	Weekly interval	6.35	9.35	23.35	13.01
	Fortnightly	5.25	8.0	12.35	11.20
T ₉ -Vermicompost (5Kg) +Vermiwash(10lit)	3days gap	11.31	16.35	38.54	22.06
	Weekly interval	10.20	15.45	35.64	20.43
	Fortnightly	8.45	14.25	32.72	18.47
Meax (X)		8.27	12.27	28.46	
SD		3.04	4.43	8.12	
CV		36.76	36.10	28.53	

It might be due to beneficial effect of richness of micronutrient in vermiwash and other source of in case of inorganic source or nutrient DAP+MOP combination gave better result than SSP+MOP, but in case of organic sources of nutrients vermiwash gave better result than any other sources and combination of sources of nutrient. It might be due to beneficial effect of richness of micronutrient in vermiwash and other source of

organic manure. Vijaynathan *et al.*, (2004) reported that the *C. equisetifolia* seedling enhanced their growth and biomass production to vermiwash compared to those with the cowdung and water spray only. This was mainly attributed to the presence of growth promoting substances in the vermiliquids. Also recorded highest collar diameter (0.75cm) and total drymass (12.0gm) of teak seedlings by spraying of vermiwash.

Table 4: Volume index

Treatments	Irrigation interval	30DAP	60DAP	90DAP	Mean
T ₁ -Control	3 days gap	2.99	14.25	57.68	24.97
	Weekly interval	2.28	12.92	53.30	22.83
	Fortnightly	1.76	9.73	45.60	19.03
T ₂ -DAP(200gm) +MOP(100gm)	3 days gap	16.06	35.30	188.32	79.89
	Weekly interval	10.62	28.12	164.22	67.65
	Fortnightly	9.57	23.8	148.23	151.23
T ₃ -SSP(200gm) +MOP(100gm)	3 days gap	6.36	21.7	104.27	44.11
	Weekly interval	5.54	19.98	93.55	39.69
	Fortnightly	4.97	19.21	86.77	36.98
T ₄ -Vermiwash (10lit)	3 days gap	12.35	29.36	199.82	80.51
	Weekly interval	9.73	27.39	171.20	69.44
	Fortnightly	7.80	25.02	141.12	57.98
T ₅ - Vermicompost(10kg)	3 days gap	7.16	23.49	106.08	45.56
	Weekly interval	6.3	21.56	116.65	48.15
	Fortnightly	5.58	19.92	104.52	43.34
T ₆ - FMY (10Kg)	3 days gap	4.37	19.21	77.80	33.8
	Weekly interval	3.87	17.72	72.16	31.19
	Fortnightly	3.27	15.75	64.97	27.99
T ₇ -FYM (5Kg)+ Vermiwash (5lit.)	3 days gap	8.25	25.87	141.21	58.44
	Weekly interval	7.29	23.70	127.08	52.69
	Fortnightly	6.75	20.81	107.11	44.89
T ₈ -FYM(5Kg) +Vermicompost(5Kg)	3 days gap	7.74	25.31	122.87	51.97
	Weekly interval	6.96	24.00	112.09	47.68
	Fortnightly	6.37	22.02	99.71	42.70
T ₉ -Vermicompost (5Kg) +Vermiwash(10lit)	3days gap	9.32	23.73	164.65	66.90
	Weekly interval	8.41	25.37	138.96	57.58
	Fortnightly	7.71	23.48	116.18	49.12
Meax (X)		7.01	22.27	115.78	
SD		3.07	5.29	40.07	
CV					

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