Effect of organic fertilizers and leaf cuttings on quality and yield of palak *(beta vulgaris Bengalensis*) Cv. All green.

ABSTRACT

The present experiment was carried out at the Horticultural Research Farm, Department of Horticulture, Babasaheb Bhimrao Ambedkar University (A Central University), Vidya Vihar, Rae Bareli Road, Lucknow,U.P., India during the year 2019-21. The field experiment was laid out in simple randomized block design comprising of eight treatments combinations with three replication son quality and yield parameters of palak. The experiment finding reveals that all the quality parameters of spinach i.e. chlorophyll content, ascorbic acid, leaf moisture and dry weight were significantly improved by FYM (M_3) and application and third time cuttings (C_3). Maximum green leaf yield/ha was reported under this treatment has significantly affect treatment (M_3) FYM manure applied and three-time cuttings. The maximum chlorophyll content was recorded under the treatment (M_3) Azotobacter and first cuttings (M_3). The maximum ascorbic acid content was noticed under the treatment(M_3) with first time cuttings (C_3).

Keywords: chlorophyll content, ascorbic acid, Azotobacter, quality

INTRODUCTION

Palak or spinach beet *(Beta vulgaris var.bengalensis)* also known as Indian spinach, spinach beet, garden beet, sag and pasalai can be grown in tropical and sub-tropical regions. It belongs to family *Chenopodiaceae* with chromosome number of 2n=18. In India, it grown on large scale. The major palak growing states in the country are Uttar Pradesh, West Bengal, Haryana, Bihar, Madhya Pradesh, Maharashtra, Punjab, Rajasthan and Gujarat. However, this crop is now gaining popularity in southern states like Karnataka. Palak is cool season leafy vegetable, generally cultivated in the sub-tropical and temperate conditions. Among stall the vegetables, the leafy vegetable shave a very high protective value. They are rich in mineral and hence can be called as “Mines of minerals”. Indian spinach is one of the worth considering leafy vegetables for development. It is fairly tolerant and can be grown successfully in saline and sodic soils.

Spinach leaves are valued for their medicinal properties. The leaves are used in inflammation paralysis, headache, earache and is remedy for disease of spleen and liver. The fresh leaves are applied to burn. It also act as mild laxative besides these medicinal values, it neutralizes the acid it produced during digestion of fatty substance and help to prevent constipation. The spinach has great important among all leafy vegetables due to its shortest span of life; many farmers are attracted

towards this leafy vegetable and demand of quality seed is rais in grapidly. The use of fertilizers, no of leaves cutting sand sowing days also effects the leaf and seed production potential.

MATERIALS AND METHODS

The present experiment was carried out at the Horticultural Research Farm, Department of Horticulture, Babasaheb Bhimrao Ambedkar University (A Central University), Vidya Vihar, Rae Bareli Road, Lucknow, U.P., India during the year 2019-21 in winter season. The selection of site was done on the basis of suitability of land for the cultivation of Palak. The field experiment was laid out in simple randomized block design comprising of eight treatments combinations with three replications on all green variety of Palak. Seed were sown by opening the small furrows of 2 cm depth at a distance of 20 cm row to row spacing with the help of sickle and seeds were sown by hand drilling and covered with fine soil. The observations which were recorded during the course of investigation was Moisture content (%), Ascorbic acid (mg/100g), Total soluble solids (T.S.S), Dry matter content, Leaf yield.

RESULTS AND DISCUSSION

The effect of organic fertilizers and cuttings of moisture content of leaves has been presentedinTable-1.The data showed that application of FYM (M_3) produced the maximum moisture content per plant (81.88%). In case of cuttings in showed that three cuttings (C_3) produced the highest moisture content (82.48%) followed by two cuttings(C_2).The minimum moisture content per plant was counted no manuring and three cuttings. Number of cuttings clearly showed that application of FYM with two the effect of organic fertilizers and cuttings of green leaf yield/plant has been recorded in (Table-2). The data showed that application of FYM (M_3) produced the maximum fresh weight of per plot (860.73g). among the manuring applied followed by Azotobacter and Vermi-compost manure. In case of cuttings. It was seen that three cuttings (C_3) produced the maximum fresh weight of leaf per plot (858.21g) followed by (C_2). The minimum fresh leaf weight per plot was found in control treatment in both cases similar findings reported by Mane *et.al*, and Rajinder *et.al*,

The effect of organic fertilizers and cuttings has been recorded in (Table-3). The data showed that application of FYM(M_3) produced the maximum fresh weight of leaves per plot (1561.05g). among the manure applied. In case of cuttings. It was seen that three cuttings (1531.87g).followed by first cuttings(C_1). The minimum weight of fresh leaves per plot was counted in control with out manuring and two cuttings in this case similar finding reported by Lal *et.al*., Rajeswari *et.al.*, Tehlan *et.al.*

The effect of ascorbic acid content in leaves due to organic fertilizers and cuttings has been

presented in (Table 4). The data showed that application of FYM (M_3) Produced the highest ascorbic content was counted in control treatment in both cases. In case of cuttings, it was seen that three cuttings (C_3) produced the maximum level of ascorbic acid per plant (66.0mg/100mg) followed by one cutting (C_1). The minimum ascorbic content was counted in control treatment in both cases. The application of FYM(M_3) produced the maximum leaf chlorophyll content per plant (1.95mg/g) among the manures applied followed by vermi-compost (M_3). In case of cuttings, it was showed that three cuttings (C_3) produced the highest leaf chlorophyll content per plant (1.88mg/g) followed by one cuttings (C_3). The minimum chlorophyll content per plant counted in control in both case presented in(Table5).

The effect of organic fertilizers and cuttings has been presented in(Table6). The data seen that application of FYM(M_3) produce the maximum green yield/ha(16.05t/ha) among the produced manure applied followed by vermicompost and Azotobacter fertilizers. In case of cuttings it was showed that three cuttings (C_3) produced the maximum green leaf yield t/ha of third cuttings (16.03t/ha) followed by two cuttings (C_2). The maximum green leaf yield /ha was counted in control without manuring and three cuttings in this case.

Table-1. Effect of organic fertilizers (^{O}F) and cuttings(C) on moisture content % of leaves of palak cv. All Green.

Treatment	Moisture content(%)				
	Number of cuttings				
Organic fertilizers	C0	C1	C2	C3	Mean
F_0-Nomanuring	82.16	79.32	81.34	80.12	80.73
F_1Azotobacter	81.23	82.26	80.11	83.32	81.73
F_2 Vermicompost	79.63	80.18	82.29	82.36	81.12
F_3FYM	81.33	79.78	82.32	84.11	81.88
Mean	81.09	80.38	81.51	82.48	
	M	C	M x C		
SEm(+)	0.015	0.008	0.023		
CD(P=0.05)	0.044	0.036	0.08		

Table-2. Effect of organic fertilizers (OF) and cuttings(C) on green yield of leaves (g) on basis of single cuttings of palak cv. All Green.

Treatment	Green yield of leaves per plot (g)
	Number of cuttings

Organic fertilizers	C_0	C_1	C_2	C_3	Mean
F_0-Nomanuring	805.89	790.60	801.25	770.84	792.14
F_1Azotobacter	829.76	817.12	832.33	879.06	839.56
F_2 Vermicompost	823.75	819.90	811.82	889.81	836.18
F_3FYM	853.50	840.90	856.04	800.93	860.73
Mean	828.50	816.96	825.22	858.21	
	M	C	Mx C		
SEm(+)	2.026	1.078	3.114		
CD(P=0.05)	5.909	3.098	9.007		

Table-3. Effect of organic fertilizers (OF) and cuttings (C) on total greenleaf yield per plot of palak cv. All Green.

Treatment	**Total fresh yield(g) per plot**				
	Number of cuttings				
Organic fertilizers	C_0	C_1	C_2	C_3	Mean
F_0-Nomanuring	1453.75	1347.48	1393.76	1430.31	1413.07
F_1Azotobacter	1459.75	1461.14	1455.69	1540.46	1479.36
F2 Vermicompost	1475.49	1460.98	1475.44	1560.53	1513.70
F_3FYM	1532.46	1562.94	1532.87	1598.78	1561.05
Mean	1464.8	1506.05	1464.44	1531.87	
	M	C	Mx C		
SEm(+)	2.094	1.047	3.141		
CD(P=0.05)	6.078	3.039	9.117		

Table-4. Effect of organic fertilizer(OF) and cutting(C) on ascorbic acid(mg/100) content in leaves of palak cv. All green

Treatment	**Ascorbic acid (mg /100g)**
	Number of cuttings

Organic fertilizers	C_0	C_1	C_2	C_3	Mean
F_0-No manuring	63.86	64.98	64.93	64.41	64.54
F_1 Azotobacter	65.25	64.99	65.21	65.42	65.22
F_2 Vermicompost	64.45	65.12	65.29	66.69	65.38
F_3FYM	64.84	66.11	65.31	67.47	65.93
Mean	64.60	65.30	65.18	66.00	
	M	C	Mx C		
SEm(+)	0.062	0.031	0.093		
CD(P=0.05)	0.018	0.09	0.108		

Table-5. Effect of organic fertilizers (OF) and cuttings(C) on chlorophyll content (mg/g) in leaves of palak cv. All Green

Treatment	**Chlorophyll content(mg/g)**				
	Number of cuttings				
Organic fertilizers	C_0	C_1	C_2	C_3	mean
F_0-Nomanuring	1.49	1.56	1.59	1.66	1.57
F_1Azotobacter	1.58	1.63	1.62	1.75	1.64
F2 Vermicompost	1.61	2.00	1.71	1.99	1.82
F_3FYM	1.77	1.88	2.02	2.12	1.95
Mean	1.61	1.76	1.73	1.88	
	M	C	Mx C		
SEm(+)	0.01	0.005	0.015		
CD(P=0.05)	0.029	0.014	0.043		

Table-6. Effect of organic fertilizers (OF) and number of cuttings (C) on green leaf yield (t/ha).

Treatment	**Green leaf yield(t/ha)**				
	Number of cuttings				
Organic fertilizers	C_0	C_1	C_2	C_3	mean

F_0-No manuring	14.26	15.10	15.45	15.04	14.96
F_1 Azotobacter	15.46	15.23	15.58	15.67	15.49
F_2 Vermicompost	15.53	15.75	15.64	16.62	15.89
F_3FYM	16.12	15.71	15.52	16.78	16.05
Mean	15.24	15.45	15.55	16.03	
	M	C	Mx C		
SEm(+)	0.048	0.024	0.072		
CD(P=0.05)	0.139	0.069	0.208		

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