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Original Research Article

Effect of Spacing and Organic Manures on Growth and Yield of Aloe Vera

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A B S T R A C T

The experiment on effect of spacing and organic manures on growth and yield of Aloe vera was laid out at field of Nagarjun Medicinal plants Garden, Dr. Panjabrao Deshmukh KrishiVidyapeeth, Akola during of 2011-12. 2012-13, 2013-14 and 201-15-16 to asses the optimum spacing and effect of organics on growth and yield of Aloe-vera. The soil at experimentalsite was clayey in texture, slightly alkaline in nature, moderate in organic carbon, medium in available nitrogen, moderate in phosphorus and moderately high in available potassium.and result shows that The planting at 60 x 30 cm spacing along with the application of 2.5 t ha^{-1} vermicompost recorded higher leaf yield and gross monetary returns in Aloe vera.

Keywords

Organic Manure, Growth, Yield of Aloe Vera

Introduction

Aloe vera L. is a succulent belongs to the family Liliaceae. It's bright green gelatinous delicate leaves contain a very small quantity of viscous yellow fluid as Aloetic juice or Aloe latex. Aloe vera gel is the colourless mucilaginous gel obtained from the paranchymatus cells of fresh leaves of Aloe, is contain mono and polysaccharides, vitamins, minerals, amino acids and enzymes. Aloe gel posses important biological properties such as anti-inflammatory, antibacterial, antitumor, antiallengic and infected wound healing. Aloe Vera is extensively used in preparation of medicines, cosmetics and food supplements. The current global turnover of raw Aloe leaves accounts to 70-80 million US $, growing at a rate of 35 % in near future.

In spite of its varied utility in medicines cosmetics and nutraceuticals the area under cultivation of this species in India is very merge. The major constraint may be due to the lack of knowledge regarding genuine type and agro technologies. Therefore it is the need of this hour to bring Aloe Vera into mainstream cultivation for commercialization and standardization of agronomic practices in order to meet its ever-growing demand and hence, the present study was carried out.

Materials and Methods

The experiment was laid out at field of Nagarjun Medicinal plants Garden, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during of 2011-12. 2012-13, 2013-14 and 201-15-16 to asses the optimum spacing and effect of organics on growth and yield of Aloe-vera. The soil at experimental site was clayey in texture, slightly alkaline in nature, moderate in organic carbon, medium in available nitrogen, moderate in phosphorus and moderately high in available potassium. The experiment was laid out in Factorial Randomized Block Design with three replications and two factors viz three spacings (S_1- 60 X 30 cm, S_2- 60 x 45 cm and S_3- 60 x 60 cm) and 5 organic manure treatments (M_0- control, M_1- vermicompost @ 2.5 t ha^{-1} & M_2- 5.0 t ha^{-1}, M_3- FYM @ 5 t ha^{-1} & M_4- 10 t ha^{-1}).

Results and Discussion

Growth contributing characters

Data presented in Table -1 revealed pooled means of plant height and No. of suckers per plant were significantly influenced by various treatments of spacing and manures. Significantly higher plant height was recorded at 60 X 30 cm spacing followed by 60 X 45 cm spacing. Whereas significantly higher number of suckers was noticed with the plant spacing of 60 x 60 cm followed by 60 X 30 cm spacing. Application of 5 t ha^{-1} vermicompost recorded significantly higher plant height and number of suckers. But it was found at par with FYM @ 10t/ha vermicompost @ 2.5 t ha^{-1}. Interaction between spacing and organic manures was non-significant in case of plant height and significant in case of No. of Suckers. The application of organics was helped to increase the cell division and elongation without hampering the nutrient uptake process which was resulted in to increase in plant height. (Hasanuzzaman *et al.*, 2008).

Yield contributing characters

Non-Significant differences were recorded in pooled means of number of leaves per plant, leaf length and leaf thickness of Aloe vera whereas, leaf width showed significant differences. The significantly higher pooled means of number of leaves, Leaf length and Leaf width was at 60 X 60 cm spacing followed by 60 X 45 cm spacing. Significantly higher leaf width was observed with 60 X 60 cm spacing but it was at par with 60 X 30 cm spacing.

Pooled means of no. of leaves per plant, leaf width and leaf thickness were recorded significant differences due to application of manures. Whereas, pooled means of leaf length were non-significant. Application of 5 t ha^{-1} Vermicompost recorded significantly higher no. of leaves per plant and leaf thickness over control. Application of 2.5 t ha^{-1} vermicompost recorded significantly higher leaf width. Interaction effect was found non-significant except on number of suckers per plant.

The data pertaining to single matured (12 months age) leaf weight and pulp recovery (Table 2) revealed that single matured leaf weight and pulp recovery were significantly highest with 60 x 30 cm spacing. Application of vermi-compost @ 2.5t ha^{-1} recorded significantly highest leaf weight and pulp recovery. The application of 10 t ha^{-1} FYM recorded significantly higher peel weight as compared to other organic treatments. Interaction effect was found non-significant. Using manure was most effective in increasing laef weight per plant was supported by findings of Saha *et al.*, (2005), Picham N (1987) and Hasanuzzaman *et al.*, (2008).

Table.1 Plant height, No. of suckers, leaves, Leaf length and width leaf thickness and leaf yield of Aloe vera as influenced by different treatments (Pooled means)

Treatments	Plant Height (cm)	No. of suck-ers plant^{-1}	No. of leaves plant^{-1}	Leaf length (cm)	Leaf width (mm)	Leaf thick-ness (mm)
Factor -A Spacing (cm)						
S_1-60x30cm	46.47	5.07	8.66	47.94	22.10	13.69
S_2-60x45cm	43.18	4.84	9.01	48.16	21.57	14.12
S_3-60x60cm	43.95	5.51	9.03	48.36	22.43	14.06
SE (m) ±	0.74	0.12	0.13	1.27	0.24	0.15
CD (P=0.05)	2.13	0.34	NS	NS	NS	NS
Factor-B Manures (t ha^{-1})						
M_0- Control	40.62	3.69	7.82	47.31	21.22	12.24
M_1-VC 2.5 t ha^{-1}	46.32	5.38	9.00	48.36	22.39	14.03
M_2-VC 5 t ha^{-1}	46.66	5.59	9.32	48.21	22.10	14.75
M_3-FYM 5 t ha^{-1}	44.52	5.52	9.13	48.51	21.65	14.28
M_4-FYM 10 t ha^{-1}	45.63	5.52	9.22	48.38	22.82	14.48
SE (m) ±	0.95	0.14	0.13	1.46	0.28	0.17
CD (P=0.05)	2.76	0.40	0.35	NS	0.76	0.48
Interaction (A*B)						
SE (m) ±	1.65	0.32	0.28	1.18	0.62	0.39
CD (P=0.05)	NS	0.89	NS	NS	NS	NS

Table.2 Leaf yield, pulp recovery, GMR, NMR and B: C ratio of Aloe vera as influenced by different treatments (Pooled means)

Treatments	Leaf weight (g /plant)	Pulp recovery (g/ plant)	Leaf Yield (t ha^{-1})	Gross Monetary Returns (Rs)	Net Monetary Returns (Rs)	B:C Ratio
Factor -A Spacing (cm)						
S_1-60x30cm	376.15	240.40	90.87	164757	81611	1.94
S_2-60x45cm	367.47	234.10	59.58	108526	47511	1.70
S_3-60x60cm	352.20	223.95	43.04	78670	29371	1.48
SE (m) ±	5.69	3.75	0.88	1627	1827	0.02
CD (P=0.05)	15.76	10.39	2.45	4510	5064	0.07
Factor-B Manures (t ha^{-1})						
M_0- Control	334.89	210.94	60.02	108829	46992	1.67
M_1-VC 2.5 t ha^{-1}	389.36	254.14	67.54	122561	55277	1.73
M_2-VC 5 t ha^{-1}	371.97	245.39	65.86	120038	57463	1.79
M_3-FYM 5 t ha^{-1}	358.28	219.97	63.23	115386	51331	1.68
M_4-FYM 10 t ha^{-1}	371.86	233.64	65.82	119773	53090	1.67
SE (m) ±	6.57	4.33	1.02	1879	2110	0.03
CD (P=0.05)	18.20	11.99	2.83	5207	5848	0.08
Interaction (A*B)						
SE (m) ±	14.68	9.67	2.28	4201	4717	0.06
CD (P=0.05)	40.70	26.82	6.32	11644	13076	0.17

Table.3 Interaction effect on leaf yield (t ha^{-1}) as influenced by spacing and organics

Treatments	S_1 - 60x30 cm	S_2 - 60x45 cm	S_3 - 60x60 cm	Mean
M_0- Control	83.20	57.09	39.77	**60.02**
M_1-VC 2.5 t ha^{-1}	**94.09**	58.73	49.80	**67.54**
M_2-VC 5 t ha^{-1}	92.11	63.86	41.59	**65.86**
M_3-FYM 5 t ha^{-1}	89.74	59.09	40.88	**63.23**
M_4-FYM 10 t ha^{-1}	**95.18**	59.15	43.14	**65.82**
Mean	**90.87**	**59.58**	**43.04**	
SE (m) ±	2.28			
CD (P=0.05)	6.32			

Leaf yield, GMR, NMR

The planting of Aloe vera at 60 X 30 cm spacing recorded significantly higher leaf yield (Table 2) over 60 X 45 cm and 60 X 60 cm spacing. The application of vermicompost @ 2.5 t ha^{-1} recorded significantly higher leaf yield followed by vermicompost @ 5 t ha^{-1} and FYM @ 10 t ha^{-1}. However, these treatments were at par with each other and significantly superior over control. Similar results were also noticed with gross monetary returns.

The significantly highest net monetary returns were recorded with 60 X 30 cm spacing and 5 t ha^{-1} Vermicompost.

Interaction Effect on Leaf Yield

The data on pooled means (Table-3) revealed that the interaction of spacing 60 x 30 cm with FYM @ 10 t ha^{-1}produced significantly highest leaf yield than other treatment combinations; however, it was at par with planting of aloe vear at 60 x 30 cm spacing alongwith either 2.5 t ha^{-1} or 5.0 t ha^{-1} Vermicompost.

The planting at 60 x 30 cm spacing along with the application of 2.5 t ha^{-1} vermicompost recorded higher leaf yield and gross monetary returns in Aloe vera.

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