Effect of cattle urine and humic acid on growth of nutmeg grafts

ABSTRACT

Seven different treatments of foliar application and drenching are applied on nutmeg grafts after 45 days of grafting up to 135 days and different growth parameter observation were recorded up to highest survival and saleable percentages. The trements are as T-$_1$(15% cattle urine drench) T_2(25 % cattle urine drench),T_3(15% cattle urine spray), T_4(25 % cattle urine spray), T_5(0.2% Humic acid drench), T_6 (0.6 % Humic acid drench) T_7(0.4% Humic acid spray), T_8 (Control –No spray), The treatment T-7 (44.35%) record significantly highest survival (95%), saleable percent (97.67%) along with highest height (15.85cm), girth(24.21mm), number of leaves(24.21) , leaf length(15.85cm) ,leaf area(44.35cm^2) and tap root in T-7 length(20.60cm).The highest cost benefit ratio were recorded significantly highest in T-7 hence for the excellent growth of nutmeg grafts in konkan region 0.4%humic acid spray is recommended .

Key words: Nutmeg grafts, foliar spray, drenching, humic acid

INTRODUCTION

Nutmeg belongs to the family *Myristicaceae* which is a small group comprising 16 genera and about 380 species. It is an important tree spice which produces two different spices namely nutmeg and mace. It is mainly distributed to the low land tropical forests of the world. Nepal, Bhutan, Grenada, Sri Lanka, Malaysia, Indonesia and Guatemala are major nutmeg growing regions. Guatemala is world's largest producers of Nutmeg (24,000 MT) which contributes 32.44 per cent of the world's total production. In India, it has occupied an area of about 23478 ha (Spice board, 2021) with an annual production of 15.24 MT (NHB 2021-22). It is grown in Tamil Nadu, Kerala, Karnataka, Assam, Andhra Pradesh, Konkan region in Maharashtra and Goa. The female nutmeg tree starts fruiting from sixth years, till the peak period is reached after 20 years. As the growth of the nutmeg graft is very slow and it takes more time to attain saleable stage .Sawant et.al. Reported that organic nutrients like cow urine and humic acid accelerates the growth of nutmeg grafts,the success of the experiment will give healthy, vigorous and sturdy saleable nutmeg graft at early stage in nursery.

MATERIAL AND METHODS

The experiment was laid out in nursery at AICRP Oil Palm, College of Horticulture, Mulde the uniformly grown grafts were selected at 45 days after grafting for the experiment along with 8 treatment, three replication along with Randomized block design .The experiment was imitated during 2019 and completed during 2023 .During the period the application of six foliar spray as well as drenching of the nutrient take at the interval of 15 days up to 135 days after grafting were take place and all growth parameters were recorded up to the salable stage i.e.,270 days There is a rising attention in the use of Humic acid as organic manures or soil tonic. El Ghamry et al. (2009) recorded that in Faba beanthe use of humic constituents as foliar use increase growth and mineral content as well as reduce the injury of chocolate spot and rust infections of. Humic ingredients comprise three types of organic acid; humin, humic acid and fulvic

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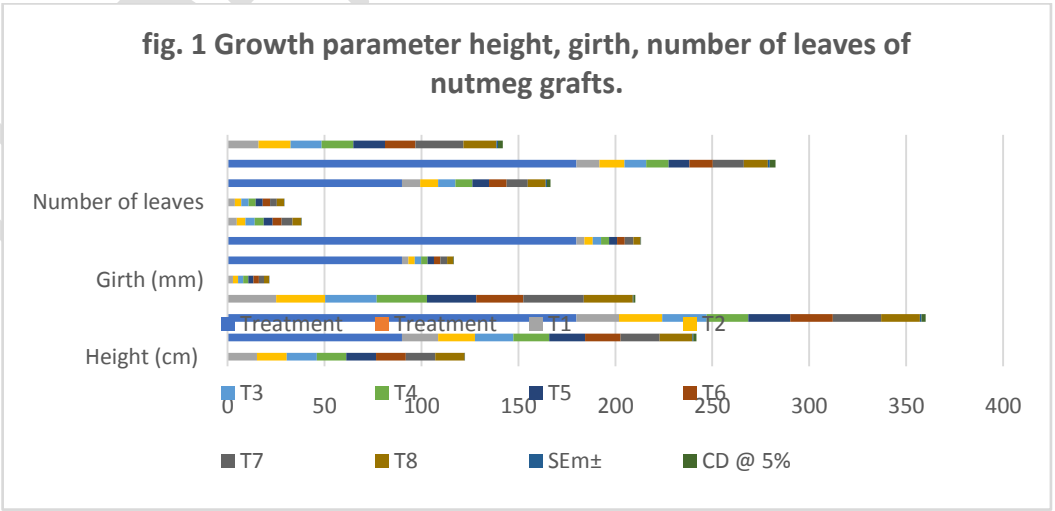
acid. They have been well-defined in humic science in harmony with their solubility features (IHSS, 2004).

REÙLTS AND DISCUSSION

Table 1: Growth parameter height, girth, number of leaves of nutmeg grafts.

Treatment		Height (cm)				Girth (mm)				Number of leaves			
		Initial	90 days	180 days	270 days	Initial	90 days	180 days	270 days	Initial	90 days	180 days	270 days
T_1	15% cattle urine drench	15.25	18.55	21.98	25.13	2.73	3.26	4.13	4.71	3.78	9.33	11.87	16.05
T_2	25 % cattle urine drench	15.33	19.01	22.17	25.22	2.70	3.28	4.25	4.51	3.33	9.37	12.87	16.42
T_3	15% cattle urine spray	15.43	19.93	22.90	26.54	2.70	3.27	4.23	4.74	3.78	8.80	11.20	16.07
T_4	25 % cattle urine spray	15.29	18.41	21.59	25.98	2.66	3.34	4.18	4.71	3.67	8.83	11.47	16.42
T_5	0.2% Humic acid drench	15.31	18.53	21.53	25.39	2.65	3.34	4.12	4.56	3.56	8.60	10.77	16.22
T_6	0.6 % Humic acid drench	15.31	18.32	21.95	24.32	2.71	3.28	3.96	4.64	3.78	9.10	12.17	15.75
T_7	0.4% Humic acid spray	15.29	20.13	25.06	31.10	2.70	3.48	4.41	5.62	3.56	10.8	15.90	24.78
T_8	Control –No spray	15.17	16.80	19.96	25.25	2.67	3.26	3.73	4.40	3.78	9.33	12.43	16.97
SEm±		0.09	0.55	0.73	0.37	0.02	0.06	0.08	0.08	0.19	0.62	1.02	0.85
CD @ 5%		NS	1.60	2.13	1.09	NS	0.19	0.26	0.23	NS	1.80	2.98	2.49



Regarding the growth parameter data revealed from Table 1 that there was non-significant effect of nutrient on height ,girth and number of leaves at initial stage.while

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Height at 90 days, 180 days and 270 days was found significantly highest (20.13 cm ,25.06 cm and 31.10 cm respectively)in T-7 . The girth at 90 days, 180 days and 270 days were found significantly highest in T-7 (3.48 mm, 4.41 mm and 5.62 mm) respectively. At 180 days the higest girth were recorded in T-2 (4.25 mm) which was at par girth with T-7. The number of leaves at 90 days, 180 days and 270 days found significantly highest in T-7 (11, 16, 24.78 respectively).

Table 2: Growth parameter leaf length, leaf area , Tap root length of nutmeg grafts.

Treatment		Leaf Length(cm)			Leaf Area (cm^2)			Tap root length (cm)	
		90 days	180 days	270 days	90 days	180 days	270 days	Initial stage	270 days
T_1	15% cattle urine drench	9.61	12.30	13.98	16.10	25.84	32.47	7.66	20.36
T_2	25 % cattle urine drench	9.54	12.20	13.76	14.85	23.81	29.31	7.83	20.52
T_3	15% cattle urine spray	10.04	12.77	14.27	16.26	25.78	31.53	7.70	20.98
T_4	25 % cattle urine spray	9.81	12.20	13.81	15.85	27.25	32.70	7.63	20.79
T_5	0.2% Humic acid drench	9.47	11.62	13.16	16.78	29.23	33.89	7.73	20.60
T_6	0.6 % Humic acid drench	9.43	12.18	13.60	18.42	29.73	36.67	7.64	20.54
T_7	0.4% Humic acid spray	9.63	13.51	15.85	22.54	36.46	44.35	7.73	24.21
T_8	Control –No spray	9.17	11.06	12.64	16.49	25.55	31.21	7.64	19.30
SEm±		0.49	0.43	0.37	1.70	1.63	2.17	0.07	0.17
CD @ 5%		1.43	1.26	1.09	4.97	4.76	6.34	NS	0.51

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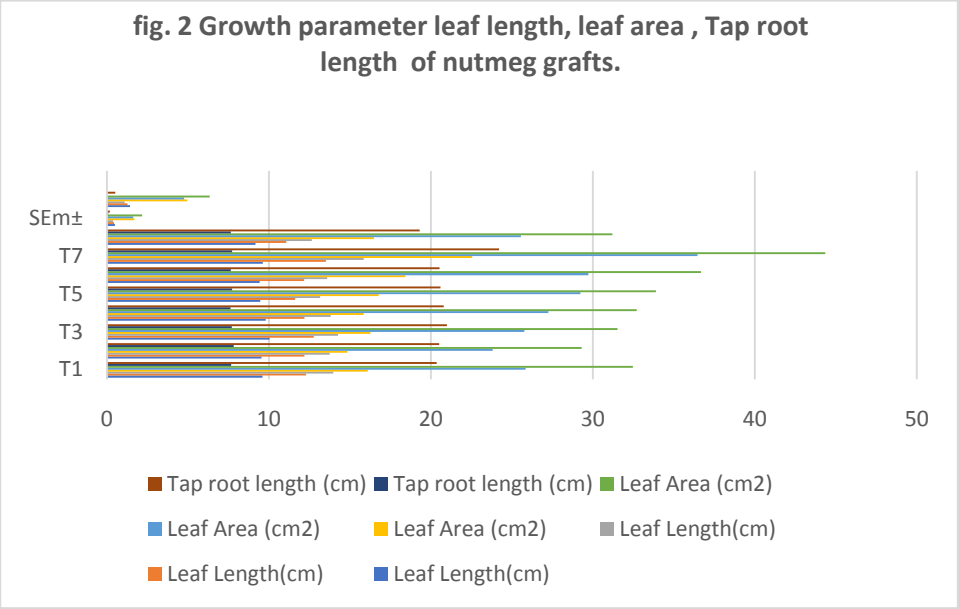

The growth parameter from Table 2 it is revealed that The leaf length at 90 days T-3 recorded highest leaf length (10.04 cm) and at 180 days and 270 days T-7 recorded highest leaf length in T-7 (13.51cm) and (15.85 cm)respectively. Leaf area at 90 days, 180 days, 270 days recorded significantly highest in T-7 (22.54 cm^2, 36.46 $cm^2$and 44.35 cm^2)Shiva et al., 2015 studied that Humic acid has three types of effect (Physical, Chemical, and Biological) on soil and plants, Physical Effect; enhance water holding capability, Increase ventilation of soil, improve soil workability, assistances in drought resistance, make soil further friable or crumbly, reduce soil corrosion. Chemical effect; chelates nutrients for endorsement by plants, holds high ion-exchange ability and rises buffering traits of soils. Increase nitrogen levels the in soil and biological effect, hastens plant cell division and stimulates growth, increase germination of seed and viability .The root length at initial stage was found non significant and at 270 days it recorded maximum in T-7 i(24.21 cm).Khaled et al., 2011reported that humic acids are beneficial in freeing up nutrients in the soil so that they are become available to the plant as needed. Quilty, 2011 studied as the humic acid molecules are small, which "allows them to reach the plant plasma membrane, where they effectively influence the assimilation of nutrients". Sinha et al., 2011 recorded during his study on humic acid also accumulates toxic heavy metals very efficiently. Meganind et al., 2015 found that the humic acid can enhance nutrient availability and improve chemical, biological, and physical soil properties (direct and indirect beneficial effects of humic acid on plant growth and development are their effect on cell membranes which lead to the enhanced transport of minerals, improved protein synthesis, plant hormone-like activity, promoted photosynthesis, modified enzyme activities, solubility of micro-elements and macro-elements, reduction of active levels of toxic minerals and increased microbial populations (Hamideh et al., 2013).

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Treatment		Survival % of grafts			Percentage of saleable grafts			C:B ratio
		90 days	180 days	270 days	90 days	180 days	270 days	
T_1	15% cattle urine drench	30.00 (33.16)*	43.50 (41.26)*	86.00 (68.24)*	97.67 (82.98)*	96.00 (80.58)*	90.33 (71.99)*	1:1.36
T_2	25 % cattle urine drench	33.33 (35.22)*	52.50 (46.44)*	86.17 (68.23)*	97.67 (82.98)*	91.83 (73.44)*	89.17 (70.81)*	1:1.34
T_3	15% cattle urine spray	30.33 (33.31)*	46.83 (43.18)*	83.83 (66.42)*	97.67 (82.98)*	93.50 (75.28)*	88.83 (70.49)*	1:1.37
T_4	25 % cattle urine spray	36.00 (36.87)*	50.83 (45.48)*	81.83 (64.98)*	97.67 (82.98)*	94.33 (76.27)*	89.17 (70.81)*	1:1.35
T_5	0.2% Humic acid drench	35.00 (36.15)*	47.50 (43.57)*	83.17 (66.06)*	97.50 (82.66)*	92.67 (74.63)*	84.83 (67.10)*	1:1.36
T_6	0.6 % Humic acid drench	40.83 (39.52)*	54.33 (47.51)*	81.00 (64.27)*	97.67 (82.98)*	93.50 (75.28)*	87.00 (68.94)*	1:1.31
T_7	0.4% Humic acid spray	51.67 (45.95)*	70.17 (56.99)*	95.00 (77.08)*	100.00 (90)*	99.33 (87.29)*	97.67 (82.98)*	1:1.45
T_8	Control – No spray	33.50 (35.16)*	46.83 (43.28)*	76.00 (61.06)*	99.33 (87.29)*	96.16 (78.81)*	88.33 (70.69)*	1:1.32
SEm±		3.30	3.34	2.24	1.07	1.35	1.78	
CD @ 5%		9.65	9.76	6.55	3.125	3.95	5.22	

Table: 3: Survival percentage, saleable percentage and Cost benefit ratio of nutmeg grafts.

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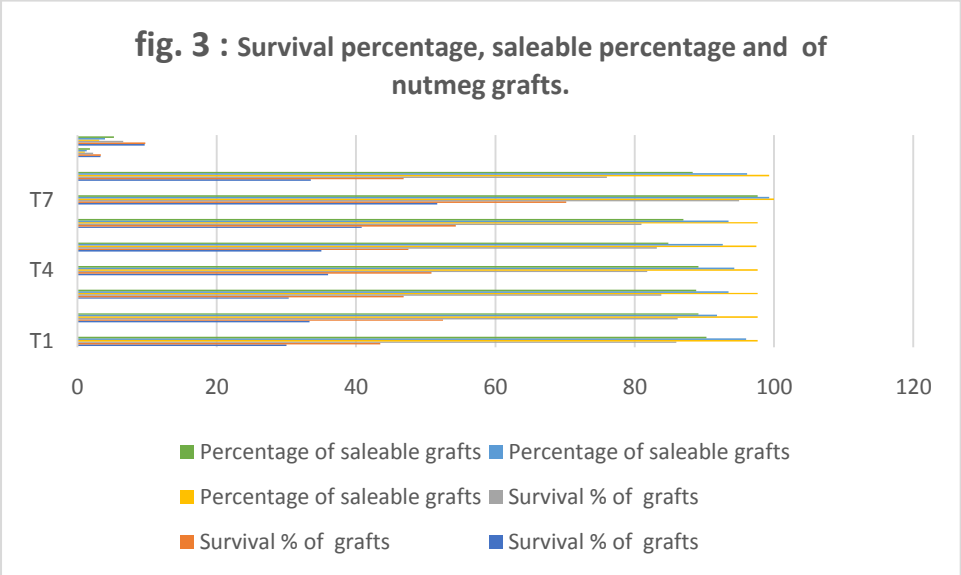

fig. 3 : Survival percentage, saleable percentage and of nutmeg grafts.

Regarding the survival and seleable % the data revealed from Table 3, the highest percentage of saleable grafts at 90 days, 180 days and 270 days significantly recorded highest in T-7 (51.67 %, 70.17% and 95%) respectively. Eisa et al., 2016; Abd El-Razek et al. 2018). Uses of humic acid as a soil application improve nutrient availability especially microelements in sandy soils because it promotes nutrient uptake in the form of chelating agent. Moreover, humic substances may increase root growth in a similar manner to auxins (O'Donnell, 1973; Khattab et al. 2012). In addition, the humic acid has many effects as it raises of cation exchange capacity which affects the retention and availability of nutrients, as well as due to a hormonal effect, or a combination of both (Chunhua et al. 1998); as a result, it can be used to solve many problems in soils such as soil nutrient availability and chemical reactions that affect the loss or fixation of almost all nutrients. Generally, there is a growing interest of the use of humic acid and K-humate as a substitute to chemical fertilizers which have potential polluting effects in the environment (Senn and Kingman, 2000).

The highest survival percentage grafts at 90 days, 180 days and 270 days significantly recorded highest in T-7 (100 %, 99.33 % and 97.67 %) respectively. The highest C: B ratio were recorded in T-7 (1: 1.89).

Conclusion:-It is concluded that the treatment T-7 (0.4 % Humic Acid Spray) recorded significantly superior among all other treatments and recorded highest height, girth, number of leaves, leaf length, leaf area, root length, survival percentage and saleable grafts.

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Trail view

Treatment Applications

At 90 days | **At 180 days** | **At 270 days**

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