RESEARCH ARTICLE

EFFECT OF ORGANIC AND INORGANIC SUBSTANCE ON SPROUTING OF ELEPHANT FOOT YAM (*AMORPHOPHALLUS PAEONIIFOLIUS* DENNST)

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Abstract: Results over two years indicated that among the different pre-planting treatments thiourea at 400 ppm (10.00 days) recorded minimum number of days to first emergence and maximum sprouting per cent (97.22 per cent) which showed 24.26 per cent increase in sprouting over control treatment. The minimum number of days to 50 per cent emergence was recorded under KNO_3 at 250 ppm (33.33) followed thiourea at 400 ppm (33.50).

Keywords: Elephant foot yam, Sprouting, Thiourea, KNO_3, GA_3

INTRODUCTION

Elephant foot yam (*Amorphophallus paeoniifolius* Dennst.) is one of the important tuber crops widely cultivated in sub-tropical regions for its underground food reserves. Traditionally, elephant foot yam is propagated through corms and cormels. Whole corm or cut corm pieces weighing about 500 g to 750 g with a part of apical meristem is mainly used as planting material. A great portion (about 25 per cent) of the harvested produce is lost as source of planting material. Gajendra variety of elephant foot yam is high yielding, free from acridity and it is popularly grown all over India as well as Chhattisgarh. Elephant foot yam tubers remain dormant for 2-3 months (Kay, 1987). As a result of this, planting and harvesting are to be done at a particular time of the year. Hence it necessitates to break the dormancy by use of organic and inorganic substances so that the planting materials could be made ready for planting early in the season to ensure early yields and lucrative market prices. However, very little information is available on the effect of dipping of seed corms (minisetts) before planting with organic and inorganic substances. Therefore, the present investigation entitled "Studies on the effect of pre-planting treatments of corms (minisetts) with different organic and inorganic substances on sprouting of elephant foot yam under agro-climatic condition of Chhattisgarh plains".

MATERIAL AND METHOD

The experiment was conducted at Research and Instructional Farm of Department of Horticulture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh during *Kharif* season of the years 2010-11 and 2011-12.The experiments were laid out in Randomized Block Design (RBD) with fifteen treatments and three replications. The treatment consisted of different concentrations of organic and inorganic substances which were applied as pre-planting soaking of corms for one hour *i.e.*T_1 (cow dung 50 % + water 50 %),T_2 (cow urine 50 % + water 50 %),T_3 (cow dung 25 % + cow urine 25 % + water 50 %),T_4 (cow dung 37.5 % + cow urine 37.5 % + water 25 %),T_5 (cow dung 50 % + cow urine 50 %), T_6 (thiourea at 200 ppm), T_7 (thiourea at 300 ppm),T_8 (thiourea at 400 ppm), T_9 (KNO_3 at 250 ppm),T_{10} (KNO_3 at 500 ppm),T_{11} (KNO_3 at 750 ppm),T_{12} (GA_3 at 100 ppm),T_{13} (GA_3 at 200 ppm), T_{14} (GA_3 at 300 ppm) and T_{15} (control treatment) *i.e.* soaking of minisetts in water. The weight of minisett (corm) is 100g for all the treatments.

The observations on days taken to first emergence of corms from date of planting was recorded from each treatment and expressed in days. The observations on days taken to 50 per cent emergence of corms from date of planting was recorded and expressed in days. The sprouting per cent was recorded after complete crop emergence. The sprouting per cent or the plant emergence per cent was calculated with the help of following formula: Sprouting per cent =

$$\frac{\text{Total number of plants emerged}}{\text{Total number of corms planted}} \times 100$$

RESULT AND DISCUSSION

Table 1 indicated that the days taken to first emergence and 50 per cent emergence. The highest response in inducing early emergence (10.00 days, pooled data) was noted with T_8 (thiourea at 400 ppm) followed by T_5 *i.e.* cow dung 50 % + cow urine 50 % and T_9 *i.e.* KNO_3 at 250 ppm (10.17 days, pooled data). The lower concentration of thiourea at 300 ppm was the next best treatment which recorded 10.50 (pooled data) days to first emergence.

Nedunchezhiyan and Mohankumar (1994) and Kumar *et al.* (1998) reported that growth regulators were found to hasten sprouting in elephant foot yam. These results are in conformity with the findings of Nedunchezhiyan *et al*. (2011) who reported that among the growth regulators, thiourea was most effective in inducing earliness in first sprouting.

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Similar results have been reported by Mukherjee *et al*. (2009) in elephant foot yam.

The enhanced sprouting of bottom corm setts of elephant foot yam by application of thiourea and potassium nitrate was also observed by Dhua *et al*. (1988). Das *et al*. (1995) indicated that thiourea (300 ppm) and KNO_3 (750 ppm) were found more effective to initiate sprouts over other concentrations of respective chemicals. Bhagavan (2005) reported that foliar spraying of KNO_3 (1- 2 per cent) and thiourea (0.5 – 1.0 per cent) recorded early and increased sprouting of seed corms of elephant foot yam.

Similar trend was noticed with regards to days to 50 per cent emergence. The minimum number of days to 50 per cent emergence was recorded under T_9 *i.e.* KNO_3 at 250 ppm (33.33) followed by T_8, $T_7$and T_6 (thiourea at 400, 300 and 200 ppm) *i.e.* 33.50, 34.17 and 36.00, respectively. The greater number of days to 50 per cent emergence was observed under T_{12}, T_{13} and T_{14} (GA_3at all the concentrations *i.e.* 100, 200 and 300 ppm) from 43.50 to 43.83 which were statistically at par with T_{15} (control treatment) *i.e.* 44.50.

Nedunchezhiyan *et al*. (2011) reported the variations in number of days to 50 per cent and 100 per cent sprouting due to pre-planting application of growth regulators.

The crop emergence was completed after 60 days of planting that means the overall sprouting was completed within 60 days after planting and data of sprouting per cent presented in Table 2 revealed that the maximum sprouting per cent was recorded under T_8 *i.e.* thiourea at 400 ppm (97.22 per cent, pooled data) followed by T_7 *i.e.* thiourea at 300 ppm (96.76 per cent, pooled data), T_6 *i.e.* thiourea at 200 ppm and T_9 *i.e.* KNO_3 at 250 ppm (95.37 per cent, pooled data) and that showed 24.26, 23.67 and 21.89 per cent increase in sprouting over control treatment, respectively. The minimum spouting per cent was obtained under T_{15} *i.e.* control treatment (78.24 per cent, pooled data) followed by T_{13} *i.e.* GA_3 at 200 ppm (79.17 per cent, pooled data), T_{14} *i.e.* GA_3 at 300 ppm (79.63 per cent, pooled data) and T_{12} *i.e.* GA_3 at 100 ppm (80.09 per cent, pooled data).

Dhua *et al.* (1988) reported that different growth substances were found to increase sprouting percentage in elephant foot yam. The findings are with the agreement of Das *et al.* (1995) who reported that soaking of corm setts with thiourea and KNO_3 increased sprouting percentage in elephant foot yam. Similar results have been reported by Bhagavan (2005) and Kumar *et al.* (1998).

CONCLUSION

Thiourea at 400 ppm was best treatment to inducing early sprouting in elephant foot yam. T_7 and T_8 (thiourea at 300 and 400 ppm) and T_9 (KNO_3 at 250 ppm) were among the best pre-planting treatments which were statistically equal among each other in reducing the number of days to 50 per cent emergence. Thiourea at 400 ppm stoot best treatment to increasing sprouting per cent in elephant foot yam.

Table 1. Effect of organic and inorganic substance on days to first emergence and days to 50 per cent emergence in elephant foot yam cv. Gajendra

Treatments			Days to first emergence			Days to 50 per cent emergence		
			2010-11	2011-12	pooled	2010-11	2011-12	pooled
T_1	:	Cow dung slurry (50%) + Water (50%)	12.00	12.33	12.17	34.67	41.00	37.83
T_2	:	Cow urine (50%) + Water (50%)	13.00	12.67	12.83	35.67	39.67	37.67
T_3	:	Cow dung (25%) + Cow urine (25%) + Water (50%)	11.00	11.67	11.33	33.67	38.67	36.17
T_4	:	Cow dung (37.5%) + Cow urine (37.5%) + Water (25%)	11.67	12.00	11.83	34.00	41.33	37.67
T_5	:	Cow dung (50%) + Cow urine (50%)	10.00	10.33	10.17	33.67	38.67	36.17
T_6	:	Thiourea at 200 ppm	11.00	10.67	10.83	33.67	38.33	36.00
T_7	:	Thiourea at 300 ppm	10.67	10.33	10.50	31.00	37.33	34.17
T_8	:	Thiourea at 400 ppm	10.00	10.00	10.00	29.00	38.00	33.50
T_9	:	KNO_3 at 250 ppm	10.00	10.33	10.17	28.33	38.33	33.33
T_{10}	:	KNO_3 at 500 ppm	10.67	11.00	10.83	34.00	38.33	36.17

T_{11}	:	KNO_3 at 750 ppm	11.00	11.33	11.17	33.67	39.00	36.33
T_{12}	:	GA_3 at 100 ppm	13.67	14.00	13.83	42.67	44.33	43.55
T_{13}	:	GA_3 at 200 ppm	15.00	15.33	15.17	43.33	44.33	43.83
T_{14}	:	GA_3 at 300 ppm	14.67	15.00	14.83	43.00	44.00	43.50
T_{15}	:	Water (Control)	16.33	16.67	16.50	43.67	45.33	44.50
CD			1.66	1.63	1.30	4.22	2.40	2.68
SEm ±			0.57	0.56	0.45	1.46	0.83	0.92

Table 2. Effect of organic and inorganic substance on sprouting per cent (60 days after planting) in elephant foot yam cv. Gajendra

Treatments			Sprouting (%)			Per cent increase over control		
			2010-11	2011-12	Pooled	2010-11	2011-12	Pooled
T_1	:	Cow dung slurry (50%) + Water (50%)	92.59	90.74	91.67	17.65	16.66	17.17
T_2	:	Cow urine (50%) + Water (50%)	90.74	91.67	91.20	15.30	17.86	16.56
T_3	:	Cow dung (25%) + Cow urine (25%) + Water (50%)	93.52	92.59	93.06	18.83	19.04	18.94
T_4	:	Cow dung (37.5%) + Cow urine (37.5%) + Water (25%)	90.74	90.74	90.74	15.30	16.66	15.98
T_5	:	Cow dung (50%) + Cow urine (50%)	93.52	92.59	93.06	18.83	19.04	18.94
T_6	:	Thiourea at 200 ppm	94.44	96.30	95.37	20.00	23.81	21.89
T_7	:	Thiourea at 300 ppm	97.22	96.30	96.76	23.53	23.81	23.67
T_8	:	Thiourea at 400 ppm	96.30	98.15	97.22	22.36	26.19	24.26
T_9	:	KNO_3 at 250 ppm	95.37	95.37	95.37	21.18	22.62	21.89
T_{10}	:	KNO_3 at 500 ppm	94.44	93.52	93.98	20.00	20.24	20.12
T_{11}	:	KNO_3 at 750 ppm	93.52	91.67	92.59	18.83	17.86	18.34
T_{12}	:	GA_3 at 100 ppm	80.56	79.63	80.09	2.36	2.38	2.36
T_{13}	:	GA_3 at 200 ppm	79.63	78.70	79.17	1.18	1.18	1.19
T_{14}	:	GA_3 at 300 ppm	79.63	79.63	79.63	1.18	2.38	1.78
T_{15}	:	Water (Control)	78.70	77.78	78.24	-	-	-
CD			4.60	3.92	3.24	-	-	-
SEm ±			1.59	1.35	1.12	-	-	-

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