Madras Agric. J., 94 (7-12) : 189-191 July-December 2007
https://doi.org/10.29321/MAJ.10.100663

Pre-sowing seed treatment to improve germination in true cassava (*Manihot esculenta*) seeds

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Abstract : The propagation of cassava *(Manihot esculenta)* through sexual seeds rather than by clones is a noval approach due to its manifold advantages like enhancing the multiplication rate several times, keeping the dreaded cassava mosaic diseases (CMD) under check, ease of seed storage and transport. Experiments were conducted at Tapioca and Castor Research Station during the years 2001 and 2002 to find out the effect of pre-sowing seed treatment using different chemicals and botanical leaf extracts in different concentrations. True cassava seeds (H226) were subjected to soaking in water, KNO3, $CaCl_2$ in 0.5 and 1 per cent solutions and Arappu *(Albezia amara)* and Pungam *(Derris indica)* fresh leaf extracts in 1 and 2 per cent solutions for 24 hours and compared with unsoaked seeds. The results of the data revealed that germination percentage and vigour index were maximum in seeds soaked in KNO_3 1 per cent solution for 24 hours when compared to unsoaked seeds.

Key words: Pre-sowing, Cassava, true seeds, fresh leaf extracts.

Introduction

Cassava has enormous potential in India for poverty alleviation and food security due to its ability to grow well in marginal and wastelands under poor management and its capacity to yield high under such unfavourable conditions. Under laboratory conditions, cassava seeds do not germinate satisfactorily (Rajendran *et al.,* 2000). Hence the study was undertaken to improve the germination percentage of cassava seeds.

Materials and Methods

Cassava true seeds of H226 cultivar was collected from Karumanthurai and the cleaned seeds were soaked in the following chemical solutions for 24 hours during the year 2001 and 2002 as experiment I and experiment II.

T_1 - Dry seed (control)
T_2 - Distilled water
T_3 - Potassium nitrage 0.5%
T_4 - Potassium nitrate 1.0%
T_5 - Calcium chloride 0.5%
T_6 - Calcium chloride 1.0%
T_7 - Arappu leaf extract 1.0%
T_8 - Arappu leaf extract 2.0%
T_9 - Pungam leaf extract 1.0%
T_{10} - Pungam leaf extract 2.0%

These seeds were sown in raised bed nursery in three replications adopting Randomised Block Design. Thirty days after sowing, germination (%), root length (cm), shoot length (cm), total seedling length (cm), dry matter production (mg/seedling) and vigour index were calculated and data were statistically analysed and the results are discussed below.

Table 1. Pre sowing seed treatment to improve germination in true Cassava seed (2001 & 2002)

Treatmens	2001					2002				
	Germination (%)	Root length (cm)	Shoot length (cm)	Total seedling length(cm)	DMP (mg/ seedling)	Vigour index	Germination (%)	Root length (cm)	Shoot length (cm)	Total seedling length(cm)	DMP (mg/ seedling)	Vigour index
Control	46	1.8	11.2	13.0	210	600	43	1.6	8.5	10.1	219	426
Water	50	2.0	11.8	13.8	230	692	52	1.8	9.5	11.3	226	589
KNO_3 @ 0.5%	54	2.3	12.0	14.3	240	772	58	1.9	10.4	12.3	228	716
KNO_3 @ 1%	61	2.8	12.5	15.3	260	929	60	2.5	10.6	13.1	230	786
$CaCl_2$ (0.5%)	54	2.0	10.9	12.9	240	698	56	2.3	9.6	11.9	226	667
$CaCl_2$ (1%)	59	2.1	11.3	13.4	250	791	57	2.3	9.7	12.0	225	689
Arappu 1%	56	2.7	12.1	14.8	250	832	57	2.4	10.0	12.4	231	707
Arappu 2%	60	2.9	12.4	15.3	262	921	59	2.6	10.8	13.4	234	791
Pungam 1%	51	2.3	12.0	14.3	218	734	56	2.3	9.8	12.1	230	679
Pungam 2%	56	2.4	12.1	14.5	220	809	55	2.4	9.9	12.3	232	677
CD (P=0.05)	3.2	0.34	0.44	0.80	4.7	50.9	2.8	0.52	0.77	0.65	5.21	70.3

Results and Discussion

Experiment I (2001)

Germination (%)

The germination % was higher (61%) in seeds soaked with KNO_3 1.0% (T4) solution which was on par with seeds soaked in 2% arappu leaf extract (T8) solution (60%) and 1.0% $CaCl_2$ (T6) solution (59%). The percentage increase over control was 15% (Table 1).

Root length (cm)

Root length was maximum in (2.9 cm) seeds soaked in arappu leaf extract (T8) solution which was on par with seeds soaked in 1% KNO_3 (T4) solution (2.8 cm) and 1.0% arappu leaf extract (T7) solution (2.7 cm) (Table 1).

Shoot length (cm)

Shoot length was also higher in the treatment T4 (12.5 cm) which was on par with the treatments T8 (12.4 cm), T7 (12.1 cm) and T10 (12.1 cm) (Table 1).

Total seedling length (cm)

Total seedling length was also followed the same trend as that of root length and shoot length (Table 1).

Dry matter production (mg/seedling)

The DMP was maximum in seedlings from the seeds soaked in arappu leaf extract (2%) solution (262 g) which was on par with the seedlings from the seeds soaked in KNO_3 1% (T4) solution (260 mg) (Table 1).

Vigour index

Vigour index was maximum in T4 (929) which was on par with T8 (921). The next best treatments were T7, T10 and T6 (Table 1).

Experiment II (2002)

Germination (%)

The germination % was maximum in seeds soaked in KNO_3 1% solution (60%) which was on par with seeds soaked in arappu fresh leaf extract (2%) and KNO_3 0.5% solution. The percentage increase over control was 17 (Table 1).

Root length (cm)

Root length was high in seedlings obtained from seeds soaked in arappu leaf extract (2%) solution (2.6 cm) and it was low (1.6 cm) in unsoaked seed (Table 1).

Shoot length (cm)

Shoot length was more in the treatment of seeds soaked in arappu leaf extract (T8) 2% solution (10.8 cm) which was on par with KNO_3 1% and 0.5% solutions. (Table 1).

Total seedling length (cm)

Total seedling length followed the same trend as that of root and shoot lengths (Table 1).

Dry matter production (mg/seedling)

The dry matter production was maximum in seeds soaked in arappu leaf extract (2%) solution (234 mg/seedling) and minimum (219 mg/seedling) in seedlings obtained from unsoaked seeds (Table 1).

Vigour index

The vigour index was maximum (792) in the seeds soaked in arappu leaf extract 2% solution, which was on par with treatment of KNO_3 1% solution and was minimum in unsoaked seeds (426) (Table 1).

The germination percentage and vigour index were maximum in cassava seeds treated in one per cent KNO_3 solution when compared to the untreated seeds. The seeds soaked in arappu 2 per cent fresh leaf extract also showed on par results with that of one per cent KNO_3 solution.

Reference

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