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Full length Research paper

Pre-sowing treatment and packaging materials effect on sorghum seed quality under storage (*sorghum bicolour* L) cv-nutra white

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An experiment was conducted in a completely randomized design with four replications during rabi, 2020-2021at seed testing laboratory of the department of genetics and plant breeding, Sam Higginbottom institute of Agriculture Technology and Science, Prayagraj, Uttar Pradesh. Genetically pure sorghum seeds var Nutra white was used for the experiment. Sorghum seeds treated with Neem leaf extract 5% @ 1 hr, Neem leaf extract 5% @ 3hrs, Neem leaf extract 5% @ 6hrs, Tulsi leaf extract 5% @ 1hr, Tulsi leaf extract 5% @ 3hrs, Tulsi leaf extract 5% @ 6hrs, Neeem+Tulsi leaf extract 5% @ 1hr, Neeem+Tulsi leaf extract 5% @ 3hrs, Neeem+Tulsi leaf extract 5% @ 6hrs, Moringa leaf extract 5% @ 1hr, Moringa leaf extract 5% @ 3hrs, Moringa leaf extract 5% @ 6hrs, and stored in different packaging materials (polythene bag, aluminium foil & cloth bag) were subjected to germination studies in laboratory, seed germination and growth parameters were recorded. The highest germination percent (93.73%), root length(10.87), shoot length(17.02), seedling length(27.90), fresh weight(1.14),dry weight(0.28), vigour index-I(2616), vigour index-II(27.06) was observed in Neem+Tulsi leaf extract 5% @ 6hrs, stored in polythene bag, followed by Neem leaf extract 5% @ 6hrs significantly whereas lowest found in control . Polythene shows maximum result followed by aluminium foil pouch; cloth bag shows minimum performance. Polythene bag is suitable for storage of sorghum seeds and cloth was found not suitable for seed storage.

Key words: Moringa, Tulsi , Neem, leaf extracts, Polythene bag , Aluminium foil pouch, Cloth bag.

INTRODUCTION

Sorghum (sorghum bicolour) is the fifth most cereal crop .It is grown on 42 million are in 98 countries eg: Africa, Asia, India, Nigeria, Mexico, China and Argentina. Which have the major producers in the world. Sorghum grains is mostly used for consuming 55% for eg: breads, flours, porridges, malted, and distilled beverages, beers. Sorghum has various shapes and sizes tight-headed, round panicle , droopy panicle that can be short or tall ,sorghum different colours such as red , orange, bronze, Tan, cream and white coloured sorghum varieties are grown and in food industry, while black and burgundy contain beneficial antioxidant properties and are utilized in other applications.

Neem leaf extract had strong anti feed ant substance effect against Spodoptera Litura on groundnut. Botanicals with anti fungal activity suggests an economic, safe and easily available alternative method for the management of leaf spot of groundnut. The substance present in neem leaf extract induce the protection against insect and pathogens hence the good viability and vigour of crop will be obtained. Ocimum sanctum L., (holy basil), called tulsi in India, is a plant recognized with its medicinal values since time immemorial .Owing to these aspects plant powders have been successfully used for the management of seed borne fungi. Moringa leaf extract also used by

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many studies as pre sowing seed treatment, where its leaves extract is considered to be rich with plant growth regulators , macro-nutrients and also improves seed germination as well as seedling vigor. seed treatment with moringa leaf extract as seed protect ant during storage. seeds treatment with Moringa concentration at 2.5 % reduces fungal infection , maintains seed viability ,vigour and growth parameters

The main purpose of storage is to reduce biological process to the highest possible minimum and remove unfavourable environment factors, the limits duration of safe storage. Sorghum associated with seed born pathogen viz., *fusarium moniliforme* that causes seed rot, *Gloecercosporasorgi* that causes zonate leaf spot, *sphacdelotheca sp.* Increasing storage period results higher reduction in germination percentage and other growth parameters.

Seed storage is most important in tropical areas because of high humidity and temperature fluctuations. Successful storage is depended upon both the objective and the plant species. The seeds of different plant species respond in varied degree of the ambient environment before and during storage. Storage condition is important to maintenance of seed quality during storage. Generally, the quality of seed of sorghum deteriorates during the storage period. Seed storage is necessary to store seeds in suitable containers, that can provide suitable condition to maintain seed quality for longer period is essential for seed preservation.

Aluminium foil pouch was moderately effective in preventing moisture uptake and maintaining seed viability, while cloth bag was less effective.

Packaging materials plays an important role in extending the storability of the seeds. The moisture proof containers will inhibit the exchange of the moisture and gases between the seeds and the surrounding atmosphere during storage. Deteriorative changes like reduced seedling vigour and reduced in germination happens when seeds are stored for long periods. Reduction in germination is an importance of increased defects in the metabolism of seeds like degradation of functional structures, enzymes degradation and inactivation, formation and activation of hydrolytic enzymes, inability of ribosomes to dissociate, breakdown of germination mechanism, genetic degradation.

The aim of the present study was to evaluate the pre-sowing treatment and packaging material effect on sorghum seed quality under storage.

MATERIALS AND METHODS

The laboratory experiment was conducted department of genetics and plant breeding. Sam Higginbottom University of Agriculture, Technology and Sciences, prayagraj. The experiment was conducted of botanicals leaf extract and storage materials followed by experimental design in complete randomized block method through petri dish method of sorghum seeds.

Treatments details: T0-control (untreated seeds) T1-neem leaf extract 5% @1hr,T2-neem leaf extract 5%@3hrs, T3-neem leaf extract 5%@6hrs, T4-tulsi leaf 5%@1hr, T5-tulsi leaf 5%@3hrs, T6-tulsi leaf 5%@6hrs, T7-neem+tulsi 5%+5%@1hr, T8- neem +tulsi 5%+5%@3hrs,T9- neem+tulsi 5%+5%@6hrs,T10- moringa leaf extract 5%@1hr, T11-moringa leaf extract 5%@3hrs, T12- moringa leaf extract 5%@6hrs.

Storage materials: polythene bag, aluminium foil pouch, cloth bag.

Procedure of Preparation of leaf extract: make the leaves dry under shade and powdered separately by using electric grinder. Take 5 grams powder and dissolve in 100ml of distilled water to make 5% leaf extract solution. Solutions were kept at room temperature for 48 hrs, after that solution were filtered with two layer of muslin cloth to remove un wanted materials. After those seeds should be soaked independently in different leaf extracts for following hrs @1,3,6 hrs.

Method of storage:

50 g seeds were maintained for all the treatments and stored in polythene bag,aluminium foil pouch and cloth bag. seeds with irrespective materials are kept on sterilized plastic tray at room temperature.

DETAILS OF METHODOLOGY:

Germination percent (ISTA 2011, 2012, 2015): germination test was conducted with 4 replications of 100 seeds each by petridish method as described by **ISTA** procedure in germination chamber. After 10 days germination percentage was calculated.

Germination (%) = no. of seeds germinated / total number of seeds kept for germination x 100

Shoot and root length(cm): Measured as mean of ten normal seedling 8 days after germination.

Seedling fresh weight(g):

Normal germination seedling in four replications were selected in separate paper bags and the seedling fresh weight was measured in gram and average fresh weight was calculated

Seeding dry weight(g): Ten normal seedlings were dried in hot air oven at 85^0Cfor 12hrs to obtain the seedling dry weight (g) according to Krishnasamy and Seshu (1990).

vigour indices:

a)Vigour index -I

Seedling vigour index will be calculated by adopting the method suggested by Baki and Anderson (1973)
Seedling vigour index = germination (%) x total seedling length (cm)

b) Vigour index – II :

vigour index in terms of mass will be determined by the multiplication of germination percentage with seedling dry weight on the day of final count
vigour index mass = germination (%) x seedling dry weight

RESULT AND DISCUSSION

The result on pre-sowing treatment on Sorghum seeds treated with, different treatments Neem leaf extract, Tulsi leaf extract, Neem +Tulsi leaf extract and Moringa leaf extract Among all the treatments Neem+Tulsi leaf extract (5%+5%) 6hrs shows maximum ,followed by T3-Neem leaf extract 5% @ 6hrs whereas minimum observed in T0-control, growth parameters and quality of sorghum effected by seeds treated with Neem+Tulsi(1:1)@6hr effect on different packaging materials like polythene, aluminium & cloth bag under storage of 4-months. polythene bag shows maximum result followed by aluminium whereas cloth bag shows minimum. The highest values of growth parameters observed in 2nd month storage and the lowest values of growth parameters observed in 4th month storage. The highest values of all seedling growth parameters resulted from 2-month storage; the lowest values resulted from seed store for 4 months.

Table 1: 1.1 Annalysis of variance for 8 seedling characters in 2nd month sorghum stored with polythene bag

S.No	Parameters		Mean Sum Of Squares
		Treatments- (df=12) (2-months)	Error-(df=39) (2-months)
1	Germination %	15.07	0.43
2	Root length	2.46	1.22
3	Shoot length	5.38	2.11
4	Seedling length	14.14	2.57
5	Seedling fresh weight	0.010	0.0010
6	Seedling dry weight	0.01	0.002
7	(a)vigour index-I	160,206	20,350
	(b)vigour index-II	12.76	2.71

Table 1: 1.1(a) Mean table of seed quality control under 2 months storage with polythene bag

S.No	Treatments	Germination (%)	Root length	Shoot length	Seedling length	Fresh weight	Dry weight	Vigour index-I	Vigour index-II
1	T0	**85.50**	**8.12**	**12.60**	**20.72**	**0.97**	**0.23**	**1,772**	**20.18**
2	T1	90.25	8.87	14.22	23.09	1.02	0.24	2,083	21.98
3	T2	88.75	9.76	14.10	23.86	1.07	0.25	2,142	23.18
4	T3	92.25	10.58	16.55	27.13	1.13	0.28	2,503	25.83
5	T4	90.00	8.74	14.84	23.59	1.00	0.24	2,127	21.49
6	T5	90.25	9.62	14.82	24.44	1.06	0.25	2,205	22.96
7	T6	86.25	10.20	15.45	25.65	1.10	0.26	2,212	22.42
8	T7	91.00	9.32	14.70	24.02	1.04	0.24	2,185	22.48
9	T8	89.50	10.04	15.45	25.49	1.09	0.26	2,281	23.67
10	**T9**	**93.75**	**10.87**	**17.02**	**27.90**	**1.14**	**0.28**	**2,616**	**27.06**
11	T10	90.25	9.32	13.70	23.02	1.05	0.25	2,077	22.68
12	T11	89.00	9.62	15.40	25.02	1.09	0.26	2,226	23.29
13	T12	90.50	10.40	15.37	25.77	1.12	0.27	2,332	25.09
	Grand Mean	89.60	9.87	1,4.94	24.60	1.07	0.99	2216	22.37
	CD@5%	1.009	1.586	2.086	2.304	0.047	0.026	209.07	2.365
	SE(m)	0.351	0.552	0.726	0.802	0.016	0.009	72.81	0.824
	SE(d)	0.497	0.781	1.027	1.135	0.023	0.013	102	1.165
	CV	0.783	11.44	9.724	6.525	3.10	6.877	6.61	7.047

Above the mean **table1:1.1(a)** of shows the result of growth parameters and seed quality control under 2nd month storage with polythene bag. T9 Neem+Tulsi leaf extract (5%+5%) 6hrs shows maximum germination percent (93.75%), root length (10.87cm) shoot length (17.02 cm) , seedling length (27.90cm), fresh weight (1.14gm), dry weight (0.28gm), vigour index-I(2,616), vigour index-II(27.06).Followed by T3-Neem leaf extract5% @6hrs germination percent (92.25%), root length (10.58cm) shoot length (16.55cm), seedling length (27.13cm), fresh weight (1.13gm), dry weight (0.28gm), vigour index-I(2502), vigour index-II(25.83).Whereas minimum observed inT0-control (untreated seeds)

Table 1: 1.2 Annalysis of variance for 8 seedling characters in 4th month sorghum stored with polythene bag

S.No	Parameters	Mean Sum Of Squares	
		Treatments- (df=12) (4-months)	Error-(df=39) (4-months)
1	Germination %	3.59	0.62
2	Root length	2.68	0.84
3	Shoot length	4.75	1.18
4	Seedling length	13.14	1.89
5	Seedling fresh weight	0.007	0.0010
6	Seedling dry weight	0.01	0.001
7	(a)vigour index-I	125,689	14,905
	(b)vigour index-II	5.61	2.00

Table 1:1.2 (a) Mean table of seed quality control under 4 months storage with polythene bag

s.no	Treatments	Germination (%)	Root length	Shoot length	Seedling length	Fresh weight	Dry weight	Vigour index-I	Vigour index-II
1	T0	**85.50**	**7.67**	**12.40**	**20.07**	**0.96**	**0.22**	**1,705**	**18.81**
2	T1	88.00	8.79	14.86	23.65	1.01	0.23	2,081	21.01
3	T2	87.25	9.64	14.01	23.66	1.05	0.24	2,065	21.67
4	T3	88.75	10.33	15.47	25.80	1.10	0.26	2,289	23.07
5	T4	88.00	8.65	14.21	22.86	0.98	0.23	2,011	20.41
6	T5	87.00	9.55	13.46	23.01	1.03	0.24	2,001	21.34
7	T6	88.25	10.10	15.24	25.35	1.09	0.25	2,237	22.56
8	T7	87.75	9.17	13.53	22.70	1.02	0.24	1,992	21.37
9	T8	87.25	9.97	15.00	24.97	0.97	0.25	2,178	22.13
10	**T9**	**90.00**	**10.56**	**16.77**	**27.34**	**1.12**	**0.26**	**2,460**	**24.21**
11	T10	88.50	9.17	13.95	23.12	1.04	0.24	2,047	21.83
12	T11	87.00	9.68	14.62	24.30	1.06	0.25	2,114	21.85
13	T12	88.75	10.00	14.90	24.90	1.10	0.25	2,209	22.18
	Grand Mean	87.92	9.52	14.50	24.00	1.02	1.24	2112	21.87
	CD@ 5%	1.138	1.31	1.56	1.97	0.044	0.023	175.275	2.031
	SE(m)	0.396	0.45	0.54	0.68	0.015	0.008	61.043	0.707
	SE(d)	0.560	0.64	0.77	0.97	0.022	0.011	86.329	1.000
	CV	0.901	9.63	7.57	5.73	2.902	6.451	5.77	6.468

Above the mean **table1:1.2(a)** of shows the result of growth parameters and seed quality control under 4th month storage with polythene bag. T9 Neem+Tulsi leaf extract (5%+5%) 6hrs shows maximum germination percent (90%), root length (10.56cm) shoot length (16.77 cm) , seedling length (27.34cm), fresh weight (1.11gm), dry weight (0.26gm), vigour index-I(2460), vigour index-II(24.21).Followed by T3-Neem leaf extract5% @6hrs germination percent (88.75%), root length (10.33cm) shoot length (15.47cm), seedling length (25.80cm), fresh weight (1.09gm), dry weight (0.26gm), vigour index-I(2289), vigour index-II(23.07).Whereas minimum observed inT0-control (untreated seeds)

Table 2 : 2.1Annalysis of variance for 8 seedling characters in 2nd month sorghum stored with alluminum foil pouch

S.No	Parameters		Mean Sum Of Squares
		Treatments- (df=12) (2-months)	Error-(df=39) (2-months)
1	Germination %	5.68	0.96
2	Root length	2.28	1.30
3	Shoot length	6.02	1.36
4	Seedling length	14.7	2.53
5	Seedling fresh weight	0.009	0.0009
6	Seedling dry weight	0.001	0.0001
7	(a)vigour index-I	143,699	18,978
	(b)vigour index-II	5.51	1.64

Table 2 :2.1 (a) Mean table of seed quality control under 2 months storagewith alluminium foil pouch

s.no	Treatments	Germination (%)	Root length	Shoot length	Seedling length	Fresh weight	Dry weight	Vigour index-I	Vigour index-II
1	T0	**86.00**	**8.12**	**12.45**	**20.57**	**0.96**	**0.22**	**1769**	**19.45**
2	T1	88.00	8.87	14.40	23.27	1.01	0.25	2059	22.54
3	T2	86.75	9.76	14.76	24.52	1.05	0.25	2163	22.70
4	T3	89.00	10.58	15.80	26.38	1.11	0.26	2347	23.36
5	T4	88.00	8.74	14.07	22.82	0.99	0.26	2024	22.92
6	T5	87.75	9.62	13.50	23.12	1.03	0.26	2046	22.87
7	T6	87.75	10.20	15.29	25.49	1.09	0.26	2286	23.51
8	T7	88.75	9.32	13.85	23.17	1.02	0.26	2066	23.18
9	T8	88.25	10.04	15.80	25.84	1.08	0.26	2294	23.43
10	**T9**	**91.00**	**10.61**	**16.90**	**27.51**	**1.13**	**0.27**	**2502**	**24.68**
11	T10	88.50	9.32	13.36	22.68	1.04	0.25	2118	22.68
12	T11	87.25	9.87	14.75	24.62	1.07	0.26	2179	23.37
13	T12	88.00	10.40	15.68	26.08	1.10	0.25	2320	22.51
	Grand Mean	87.08	9.65	14.66	25.93	1.05	0.259	2158	22.8
	CD@ 5%	1.40	1.09	1.675	2.28	0.043	0.021	197.78	1.84
	SE(m)	0.49	0.572	0.583	0.79	0.015	0.007	68.8	0.64
	SE(d)	0.69	0.809	0.85	1.12	0.021	0.01	97.41	0.90
	CV	1.11	11.853	7.95	6.54	2.90	5.56	6.38	5.60

Above the mean **table2:2.2(a)** of shows the result of growth parameters and seed quality control under 2nd month storage with aluminium foil pouch. T9 Neem+Tulsi leaf extract (5%+5%) 6hrs shows maximum germination percent (91.00%), root length (10.61cm) shoot length (16.90 cm) , seedling length (27.51cm), fresh weight (1.13gm), dry weight (0.27gm), vigour index-I(2385), vigour index-II(24.68).Followed by T3-Neem leaf extract5% @6hrs germination percent (89.00%), root length (10.58cm), shoot length (15.80cm), seedling length (26.38cm), fresh weight (1.11gm), dry weight (0.26gm), vigour index-I(2502), vigour index-II(23.36).Whereas minimum observed inT0-control (untreated seeds).

Table 2 : 2.2 Annalysis of variance for 8 seedling characters in 4th month sorghum stored with alluminum foil pouch

S.No	Parameters	Mean Sum Of Squares	
		Treatments- (df=12) (4-months)	Error-(df=39) (4-months)
1	Germination %	3.06	0.87
2	Root length	2.27	0.81
3	Shoot length	4.70	1.38
4	Seedling length	13.4	2.00
5	Seedling fresh weight	0.008	0.0009
6	Seedling dry weight	0.001	0.0001
7	(a)vigour index-I	121,314	14931
	(b)vigour index-II	8.05	0.768

Table 2:2.2 (a) Mean table of seed quality control under 4 monthsstorage with alluminium foil pouch

s.no	Treatments	Germination (%)	Root length	Shoot length	Seedling length	Fresh weight	Dry weight	Vigour index-I	Vigour index-II
1	T0	**86.50**	**7.23**	**12.26**	**19.50**	**0.95**	**0.22**	**1,686**	**19.03**
2	T1	87.75	8.48	14.12	22.61	1.00	0.23	1,983	20.52
3	T2	88.25	9.28	14.67	23.95	1.01	0.24	2,113	21.77
4	T3	88.00	9.97	15.71	25.68	1.09	0.25	2,261	23.32
5	T4	87.75	8.22	14.3	22.52	0.99	0.22	1,976	19.73
6	T5	88.50	9.03	13.59	22.63	1.00	0.24	2,002	21.38
7	T6	87.50	9.68	15.07	24.75	1.07	0.24	2,196	22.61
8	T7	88.25	8.87	13.35	22.22	1.00	0.23	1,960	20.71
9	T8	88.75	9.73	14.60	24.33	0.99	0.25	2,159	22.69
10	**T9**	**90.00**	**10.11**	**16.47**	**26.58**	**1.11**	**0.26**	**2,385**	**23.78**
11	T10	87.75	9.01	15.17	24.18	1.02	0.24	2,128	21.07
12	T11	86.50	9.49	14.93	24.43	1.04	0.24	2,161	22.05
13	T12	88.00	10.00	15.23	25.24	1.07	0.26	2,221	23.20
	Grand Mean	87.98	9.16	14.58	23.7	1.02	0.246	2095	21.69
	CD@ 5%	1.345	1.29	1.69	2.03	0.044	0.014	175	1.25
	SE(m)	0.469	0.45	0.58	0.70	0.015	0.005	61	0.43
	SE(d)	0.663	0.63	0.83	1.00	0.021	0.007	86	0.62
	CV	1.065	9.84	8.08	5.95	3.02	3.883	5	4.04

Above the mean **table2:2.2 (a)** of shows the result of growth parameters and seed quality control under 4th month storage with aluminium foil pouch. T9 Neem+Tulsi leaf extract (5%+5%) 6hrs shows maximum germination percent (90%), root length (10.11cm) shoot length (16.47 cm) , seedling length (26.58cm), fresh weight (1.11gm), dry weight (0.26gm), vigour index-I(2385), vigour index-II(23.78).Followed by T3-Neem leaf extract5% @6hrs germination percent (88.0%), root length (9.97cm) shoot length (15.71cm), seedling length (25.68cm), fresh weight (1.09gm), dry weight (0.25gm), vigour index-I(2261), vigour index-II(23.32).Whereas minimum observed inT0-control (untreated seeds)

Table 3 :3.1 Annalysis of variance for 8 seedling characters in 2ndmonth sorghum stored with cloth bag

S.No	Parameters	Mean Sum Of Squares	
		Treatments- (df=12) (4-months)	**Error-(df=39) (4-months)**
1	Germination %	3.06	0.87
2	Root length	2.27	0.81
3	Shoot length	4.70	1.38
4	Seedling length	13.4	2.00
5	Seedling fresh weight	0.008	0.0009
6	Seedling dry weight	0.001	0.0001
7	(a)vigour index-I	121,314	14931
	(b)vigour index-II	8.05	0.768

4TH Month sorghum stored with alluminum foil pouch

Table 2:2.2 (a) Mean table of seed quality control under 4 months storage with alluminium foil pouch

s.no	Treatments	Germination (%)	Root length	Shoot length	Seedling length	Fresh weight	Dry weight	Vigour index-I	Vigour index-II
1	T0	**86.50**	**7.23**	**12.26**	**19.50**	**0.95**	**0.22**	**1,686**	**19.03**
2	T1	87.75	8.48	14.12	22.61	1.00	0.23	1,983	20.52
3	T2	88.25	9.28	14.67	23.95	1.01	0.24	2,113	21.77
4	T3	88.00	9.97	15.71	25.68	1.09	0.25	2,261	23.32
5	T4	87.75	8.22	14.3	22.52	0.99	0.22	1,976	19.73
6	T5	88.50	9.03	13.59	22.63	1.00	0.24	2,002	21.38
7	T6	87.50	9.68	15.07	24.75	1.07	0.24	2,196	22.61
8	T7	88.25	8.87	13.35	22.22	1.00	0.23	1,960	20.71
9	T8	88.75	9.73	14.60	24.33	0.99	0.25	2,159	22.69
10	**T9**	**90.00**	**10.11**	**16.47**	**26.58**	**1.11**	**0.26**	**2,385**	**23.78**
11	T10	87.75	9.01	15.17	24.18	1.02	0.24	2,128	21.07
12	T11	86.50	9.49	14.93	24.43	1.04	0.24	2,161	22.05
13	T12	88.00	10.00	15.23	25.24	1.07	0.26	2,221	23.20
	Grand Mean	87.98	9.16	14.58	23.7	1.02	0.246	2095	21.69
	CD@ 5%	1.345	1.29	1.69	2.03	0.044	0.014	175	1.25
	SE(m)	0.469	0.45	0.58	0.70	0.015	0.005	61	0.43
	SE(d)	0.663	0.63	0.83	1.00	0.021	0.007	86	0.62
	CV	1.065	9.84	8.08	5.95	3.02	3.883	5	4.04

Above the mean **table2:2.2(a)** of shows the result of growth parameters and seed quality control under 4th month storage with aluminium foil pouch. T9 Neem+Tulsi leaf extract (5%+5%) 6hrs shows maximum germination percent (90%), root length (10.11cm) shoot length (16.47 cm) , seedling length (26.58cm), fresh weight (1.11gm), dry weight (0.26gm), vigour index-I(2385), vigour index-II(23.78).Followed by T3-Neem leaf extract5% @6hrs germination percent (88.0%), root length (9.97cm) shoot length (15.71cm), seedling length (25.68cm), fresh weight (1.09gm), dry weight (0.25gm), vigour index-I(2261), vigour index-II(23.32).Whereas minimum observed inT0-control (untreated seeds)

Table 3 : 3.1Annalysis of variance for 8 seedling characters in 2ndmonth sorghum stored with cloth bag

S.No	Parameters	Mean Sum Of Squares	
		Treatments- (df=12) (2-months)	Error-(df=39) (2-months)
1	Germination %	5.48	1.08
2	Root length	2.26	0.92
3	Shoot length	8.67	1.62
4	Seedling length	19.31	1.79
5	Seedling fresh weight	0.008	0.0008
6	Seedling dry weight	0.004	0.0012
7	(a)vigour index-I	154,200	14,774
	(b)vigour index-II	5.33	2.22

Table 3 : 3.1 (a) Mean table of seed quality control under 2 months storage with cloth bag

s.no	Treatments	Germination (%)	Root length	Shoot length	Seedling length	Fresh weight	Dry weight	Vigour index-I	Vigour index -II
1	T0	**84.25**	**7.54**	**11.342**	**18.89**	**0.95**	**0.22**	**1600**	**18.67**
2	T1	86.00	8.49	12.723	20.78	0.99	0.24	1,841	21.29
3	T2	86.25	9.35	13.820	22.36	1.03	0.25	2,015	21.55
4	T3	87.75	10.20	15.245	25.44	1.09	0.26	2,232	22.81
5	T4	86.75	8.31	11.845	25.15	0.99	0.23	2181	19.95
6	T5	86.75	9.26	13.680	20.40	1.00	0.25	1,990	21.74
7	T6	87.00	9.73	15.105	22.36	1.07	0.25	2,172	22.32
8	T7	85.50	9.10	13.698	23.63	1.01	0.25	1,970	21.35
9	T8	86.50	9.88	14.918	24.87	1.06	0.26	2,157	22.52
10	**T9**	**89.00**	**9.24**	**16.523**	**25.76**	**1.11**	**0.27**	**2,292**	**24.03**
11	T10	87.50	9.08	13.500	24.80	1.01	0.24	1,981	21.21
12	T11	87.25	9.49	14.530	25.35	1.05	0.25	2,102	22.29
13	T12	85.75	10.13	15.400	23.35	1.08	0.26	2,195	22.26
	Grand Mean	86.63	9.22	16.41	22.75	1.03	0.251	2025	21.7
	CD@ 5%	1.494	1.382	1.830	1.89	0.042	0.023	174.50	2.141
	SE(m)	0.520	0.481	0.637	0,65	0.014	0.008	60.77	0.746
	SE(d)	0.736	0.681	0.901	0.933	0.020	0.012	85.94	1.055
	CV	1.201	10.441	9.089	5.79	2.88	6.490	6.002	6.856

Above the mean **table3:3.1(a)** of shows the result of growth parameters and seed quality control under 2nd month storage with cloth bag. T9 Neem+Tulsi leaf extract (5%+5%) 6hrs shows maximum germination percent (89%), root length (9.24cm) shoot length (16.52cm) , seedling length (25.76cm), fresh weight (1.11gm), dry weight (0.28gm), Vigour index-I(2292), vigour index-II(24.92).Followed by T3-Neem leaf extract5% @6hrs germination percent (87.75%), root length (10.20cm) shoot length (15.24cm), seedling length (25.44cm), fresh weight (1.09gm), dry weight (0.27gm), vigour index-I(2232), vigour index-II(23.69).Whereas minimum observed inT0-control (untreated seeds)

Table 3 : 3.1Annalysis of variance for 8 seedling characters in 4thmonth sorghum stored with cloth bag

S.No	Parameters	Mean Sum Of Squares	
		Treatments- (df=12) (4-months)	**Error-(df=39) (4-months)**
1	Germination %	5.31	4.92
2	Root length	2.41	0.60
3	Shoot length	9.84	0.62
4	Seedling length	21.2	0.81
5	Seedling fresh weight	0.009	0.0010
6	Seedling dry weight	0.009	0.004
7	(a)vigour index-I	185,393	8240
	(b)vigour index-II	6.81	2.09

Table 3 : 3.2(a) Mean table of seed quality control under 4 monthsstorage with cloth bag

s.no	Treatments	Germination (%)	Root length	Shoot length	Seedling length	Fresh weight	Dry weight	Vigour index-I	Vigour index-II
1	T0	**84.75**	**7.14**	**10.47**	**17.62**	**0.92**	**0.22**	**1493**	**19.07**
2	T1	86.75	7.65	12.38	20.03	0.98	0.26	1738	22.67
3	T2	86.00	8.55	13.29	21.84	1.00	0.27	1879	23.33
4	T3	87.00	9.60	15.47	25.00	1.06	0.26	2175	23.18
5	T4	86.75	7.89	13.04	20.94	0.99	0.25	1817	21.86
6	T5	86.75	8.79	12.92	21.71	0.94	0.26	1883	23.24
7	T6	85.75	9.17	14.68	23.85	1.03	0.26	2045	22.92
8	T7	84.80	8.64	12.20	20.85	0.97	0.26	1768	22.04
9	T8	86.00	9.11	14.59	23.70	0.93	0.27	2039	23.45
10	**T9**	**88.75**	**9.72**	**15.32**	**25.04**	**1.07**	**0.26**	**2222**	**23.96**
11	T10	87.00	8.78	13.71	22.49	1.00	0.25	1957	22.50
12	T11	86.75	9.05	14.29	23.35	1.02	0.23	1983	23.17
13	T12	86.25	9.52	15.06	24.58	1.05	0.26	2120	22.57
	Grand Mean	86.35	8.74	13.73	22.47	1.00	0.262	1941	22.65
	CD@ 5%	1.750	1.112	1.135	1.293	0.046	0.020	130.325	2.078
	SE(m)	1.109	0.387	0.395	0.450	0.016	0.007	45.389	0.724
	SE(d)	1.569	0.548	0.559	0.637	0.022	0.010	64.189	1.024
	CV	2.570	8.864	5.756	4.009	3.26	5.429	4.675	6.389

Above the mean **table3:3.2(a)** of shows the result of growth parameters and seed quality control under 4th month storage with cloth bag. T9 Neem+Tulsi leaf extract (5%+5%) 6hrs shows maximum germination percent (88.75%), root length (9.72cm) shoot length (15.32cm) , seedling length (25.04cm), fresh weight (1.07gm), dry weight (0.27gm), vigour index-I(2222), vigour index-II(23.96).Followed by T3-Neem leaf extract5% @6hrs germination percent (87%), root length (9.60cm) shoot length (15.47cm), seedling length (25.07cm), Fresh weight (1.06gm), dry weight (0.26gm), vigour index-I(2180), vigour index-II(23.18).Whereas minimum observed inT0-control (untreated seeds)

DISCUSSION :

The different leaf extracts, had significant effect on growth parametrs . Plant extracts had been reported to have effective control of pathogenic fungi on sorghum, aqueous extraction of neem has been found in environmentally safe it eliminate or reduces the incidence of the economic important pathogens and also increase the seed germination .The bio activity of neem extract has been attributed to various compounds found in seeds and leaves such as nimbin, nimbidin, salannin. But the most important of these compounds azadirachtin . Neem and Tulsi plant product have been effectively employed for seed treatment against seed borne fungi and their synergetic effect enhance seedling parameters and seed quality. Combination of neem+tulsi leaf extract induce the protection against insect and pathogen. Generally seed stored in moisture impervious containers like aluminium foil pouch and polythene bag had storability for longer period compare to cloth bag, paper bag, jute bag under ambient storage condition. seed stored in moisture impervious sealed

containers is to prevent mainly the migration of moisture content from the surrounding environment. Decrease in the mitochondrial respiration during storage with per oxidative change in lipid mitochondria that leads loss of seed vigour ie., growth is slow seedlings are abnormal .In storage number of biotic and abiotic factors influenced the storage potential of seeds and results is decreases the seed quality deterioration . their enzyme activity decreases by increase in storage period.

CONCLUSION

The investigation revealed that treated with leaf extracts, seeds in general exerted a profound in growth parameters. Among all the tested packaging materials and treatments, Seed stored in polythene bag and aluminum foil pouch with treatment (Neem+Tulsi) (1:1) @ 6hrs showed considerable higher results. Where as the seed stored in cloth bag shows lower results. Therefore, leaf extracts are cheap and ecofriendly. In view of this we recommend use of Neem+Tulsi leaf extract for pre sowing treatment on sorghum seed quality under storage .

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REFERENCES

Abdul-Rafiu AM (2006). Effect of selected botanicals on maize storage weevils during storage under ambient conditions.

Abdusalaam S, Shenge KS (2011). Seed borne pathogens on farmer-saved sorghum (Sorghum bicolor L.) seed. 2(2): 24-28.

Alam MM, Rahman MM (2005). Effect of seed moisture content and thickness of polythene bag on germination and vigour of soybean seed. Bangladesh J. Seed Sci. & Tech.9(1&2):33-38

Al-Yahya SA (1995). Losses of corn in the storage. 13: 199-212.

Al-Yahya SA (2001). Effect of storage conditions on germination in Wheat. 186:273- 279

AOSA (Association of Official Seed Analysts). 1983. Seed Vigor Testing Handbook. Contribution No. 32 to the Handbook on Seed Testing

Asha S, Shrvan Kumar (2019). Effect of Botanicals Seed Treatment for Seed Vigour of Maize Variety Vivek 27. Int.J.Curr.Microbiol.App.Sci (2019) 8(4):2742-2748.

Badavath Neha, Abhinav Dayal, Bineetha MB, Ramteke PW (2018). Influence of Pre-Sowing Treatments on Germination and Seedling vigour of wheat (*Triticum durum*L.*)* International Journal of Pure & Applied Bioscience (IJPAB)

Bhandari G, Ghimire TB, Kaduwal S, Shrestha J, Acharya R (2017). Effects of storage structures and moisture contents on seed quality attributes of quality protein maize. *Journal of Maize Research and Development*. 3(1): 77-85.Babariya, C. A., Patel, J.B., Ribadiya, K.H. Sondarva Jyoti and Bhatiya, V.J Performance of neem products on the storability of mungbean [Vigna radiata (L.) Wilczek] seeds. Indian Journal of Agricultural Research.2016. (50):573-578

Deepak Chand Bhateshwar, Deepti Prabha, Deepak Jangid, Mohammad Salman (2020) Effect of Seed Priming with Botanicals on Plant Growth and Seed Yield of Lentil (Lens culinaris M.) International Journal of Current Microbiology and Applied Sciences ISSN: 2319-7706 Volume 9 Number 7

ISTA (International Seed Testing Association). (2013). International rules for seed testing. Seed Science and Technology. Supplement Rules: 27-57.

Jagtap KB (2006). Effect of packaging materials on seed quality of sorghumcultivars (*Sorghum bicolor*L.) Moench] during ambient storage condition. *M.Sc. (Agri.) thesis*. Mahatma Phule Krishi Vidyapeeth, Rahuri.

Kandil AA, Sharief AE, Sayed AA (2019). Seedling parameters of some maize hybrids as affected by seed storage periods, conditions and materials. *Global Advanced Research Journal of Agricultural Science*. 8(2):077-085.

Kandil AA, Sharief AE, Sayed AA (2019). Seedling parameters of some maize hybrids as affected by seed storage periods, conditions and materials. *Global Advanced Research Journal of Agricultural Science*. 8(2):077-085.

Kartoori Saisanthosh, NK Biradar Patil (2018) Effect of packaging materials and moisture content on seed storability of onion Journal of Pharmacognosy and Phytochemistry 2018; 7(4): 1745-1750

Keta JN, Suberu HA, Shehu K. Yahayya U, Mohammad NK. Gudu GB. Effect of neem (azadirachtaindicaa.juss) leaf extract on the growth of aspergillus species isolated from foliar diseases of rice (Oryza sativa) science world journal vol 14(no 1)2019

Krishnasamy V, Seshu DV (1990). Phosphine fumigation influence on rice seed germination and vigor. Crop Sci., 30: 28-85