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Population of fungi associated with seed germination after storage and seed treatment

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Introduction

Fungi growth occurs in seeds as a result of environmental conditions (high relative humidity, suitable temperature and high level of seed moisture content). But pathogen free healthy seeds are required for plant propagation. Microbial and insect attack affect seeds throughout the life cycle of the plant (Islam *et al.*, 2009). Fungi are the most common microbes that affect seed germination and they can be both saprophytic and pathogenic. Hence, the aim of this experiment is to determine the cultural and morphological characteristics and population of fungi associated with the germination of some legume seeds after storage and scarification.

Materials and Methods

One hundred and eighty seeds each of five legume plants namely *Enterolobium cyclocarpum*, *Leucaena leucocephala*, *Albizia saman*, *Albizia lebbek* and *Tephrosia bracteolata* were collected and stored for 6 months under three storage conditions (refrigerator, bottle and sac). Seeds were then scarified with concentrated sulphuric acid and 10 seeds were planted per petri dish and replicated three times. The fungi population were determined with the pour plate technique using Potato – Dextrose agar (PDA) and Sabouraud Dextrose agar (SDA). The experiment was a 3X2X2X5 factorial experiment comprising of 3 storage conditions, 2 scarification methods, 2 germination conditions and 5 legume species. The data obtained were analyzed using general linear model of SAS (1999) package.

Results and Discussion

Germinated seeds from cold storage in the refrigerator had more population of fungi (69.15×10^{-2} CFU/ml), while in the case of ungerminated seeds the highest fungi population (77.15×10^{-2} CFU/ml) was in those stored in sacks. This may be because the conditions suitable for seed viability to be maintained are also conducive for fungi growth since they thrive in wet conditions (Sutherland *et al.*, 1987). Seeds treated with acid irrespective of germination, had the highest fungi population which may be due to the opening created according to Herman (1983). Only *Enterolobium cyclocarpum* seeds had the highest fungi population (94.83×10^{-2} CFU/ml) which differ significantly from others (30.79×10^{-2} CFU/ml to 35.12×10^{-2} CFU/ml). This may be because the seeds of *Enterolobium cyclocarpum* is more than twice the size of the other seeds.

Table 1: Effects of storage conditions, method of scarification and germination on population of fungi.

Treatments	Fungi population (10^{-2} CFU/ml)		
	germinated	ungerminated	average
Effects of storage conditions			
Refrigerator	69.15 ^a	26.75 ^b	56.40
Bottle	19.87 ^c	46.65 ^{ab}	47.95
Sack	35.64 ^b	77.15 ^a	33.26
Average	41.55	50.18	
SEM	2.69	9.16	7.27
Effects of Scarification			
Acid	52.50 ^a	69.87 ^a	61.18 ^a
Untreated	30.61 ^b	30.50 ^b	30.55 ^b
Average	41.55	50.18	
SEM	4.04	14.07	10.91
Effects of Species			
<i>Enterolobium cyclocarpum</i>	54.00 ^a	135.67 ^a	94.83 ^a
<i>Leucaena leucocephala</i>	33.58 ^b	35.58 ^b	35.12 ^b
<i>Albizia lebbek</i>	46.82 ^{ab}	23.42 ^b	34.58 ^b

<i>Albizia saman</i>	41.20 ^{ab}	26.83 ^b	34.02 ^b
<i>Tephrosia bracteolata</i>	32.17 ^b	29.42 ^b	30.79 ^b
Average	41.55	50.18	
SEM	5.63	1.61	4.36

a.b.c Means in the same column with different superscripts are significantly different at P<0.05

SEM: Standard error of the mean

Table 2: Population of fungi in seeds of legume plants as influenced by interaction of storage conditions, scarification and germination.

Germination	Storage	Treatment	Fungi population (10 ⁻² CFU/ml)				
			EC	LL	AL	AS	TB
Ungerminated	Refrigerator	Acid	58.5 ^e	21.5 ^g	43.0 ^c	2.0 ⁱ	6.0 ^h
		untreated	89.0 ^{cd}	6.0 ⁱ	2.5 ^f	22.0 ^f	17.0 ^e
	Bottle	Acid	102.0 ^{bc}	35.0 ^f	6.0 ^f	68.0 ^b	73.0 ^b
		untreated	13.5 ^k	62.0 ^c	23.0 ^d	21.0 ^f	23.0 ^d
	Sac	Acid	531.0 ^a	6.0 ⁱ	63.0 ^c	19.0 ^g	14.0 ^e
		untreated	20.0 ^j	83.0 ^b	3.0 ^f	29.0 ^e	3.5 ^h
SEM			4.16	0.91	2.64	0.38	8.75 ^h
Germinated	Refrigerator	Acid	92.5 ^{cd}	101.0 ^a	110.0 ^a	101.0 ^a	83.5 ^a
		untreated	68.5 ^d	2.0 ⁱ	3.0 ^f	62.5 ^c	57.0 ^c
	Bottles	Acid	50.0 ^f	11.5 ^h	14.0 ^e	16.0 ^h	10.0 ^g
		untreated	37.0 ^h	10.0 ^h	27.4 ^{cd}	12.3 ^h	10.5 ^g
	Sac	Acid	32.5 ⁱ	40.0 ^d	96.0 ^b	17.0 ^h	12.0 ^f
		untreated	43.5 ^g	37.0 ^e	30.0 ^d	38.4 ^d	10.0 ^g
SEM			5.0	0.33	0.56	0.59	0.48

a.b.c Means in the same column with different superscripts are significantly different at P<0.05

SEM: Standard error of the mean

Conclusion

Seeds stored in refrigerator and or scarified have more fungi population and also the larger the seed size, the higher the fungi population.

References

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