

CHANGE IN RESPIRATION OF SESAME SEEDLINGS DUE TO STORAGE OF SEEDS WITH *ASPERGILLUS FLAVUS*

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O₂ uptake of the extract of cotyledonary leaves of seedling of sesame raised from seeds stored with *Aspergillus flavus* was more besides stimulated pyruvic, alpha-ketoglutaric and succinic acid dehydrogenase and peroxidase activities. The increase in RH level of storage of the seeds raised the above activities of the seedlings.

Keywords: *Aspergillus flavus*; Respiration; Seedling; Sesame seed.

Introduction

Stimulated respiration of the seeds due to storage fungi has been an established fact¹⁻⁴. The present paper deals with respiration of the seedlings of sesame (*Sesamum indicum* L.) raised from the seeds stored with *Aspergillus flavus* Link ex Faries at varying RH level.

Material and Method

A. flavus was isolated from stored sesame seeds. One hundred and fifty seeds were sterilized with 0.1% HgCl₂ solution for 1 min followed by washing with sterilized water three times. Fifteen seeds were plated on sterilized moist blotter in petridishes. *A. flavus* was isolated after a week of incubation at 28 ± 1°C and cultured in pure form on CDA medium for a week at 28 ± 1°C. Fresh seed lot was surface sterilized as noted earlier and spore suspension of the fungus was prepared in sterilized distilled water adjusting the number of spore to 1 x 10³ ml with the help of haemocytometer. 1 ml suspension was used to infest 10 gm of sterilized seeds. Seed lots were stored in desicators in triplicate at 30 ± 1°C for 20 days, over 60, 70 and 80% RH prepared with glycerol^{5,6}. The control

seed lot was uninfested and was stored in the manner as stated for the infested seedlot.

Seedlings from surface sterilized seeds were raised in earthen pots taking garden soil sterilized at 20 psi for two consecutive days. Fifteen seeds were sown per pot nearly at equal distance and the surface was covered with 1cm thick sterilized cotton wool for 3 days.

The pots were shifted to the green house (Max.temp. 25.4°C - 30.7°C, Min. temp.9.5—11.8°C). Cotyledonary leaves were randomly taken for measuring the respiration. Manometric method⁷ was applied to measure O₂ uptake. Dehydrogenase activity of pyruvic acid, alpha - ketoglutaric and succinic acid was assayed⁸, peroxidase activities was also measured^{5,9}.

Results and Discussion

It appears that O₂ uptake of the extract of cotyledonary leaves of seedlings raised from *A. flavus* stored was more at all the RH level. It was enhanced with increase in the RH level of storage of the seeds (Table 1). The activities of dehydrogenase of pyruvic, alpha-ketoglutaric and succinic acid, peroxidase were more in the said leaves due to storage

Table 1. O₂ consumed by the extract of the cotyledonary leaves raised from *A. flavus* seeds at varying RH (expressed as $\mu\text{l O}_2$)

RH%	I/C	Time interval in min.		
		30	60	90
60	I	1.152	2.439	3.421
	C	0.752	1	2.342
70	I	3.242	4.120	5.138
	C	1.621	2.328	3.125
80	I	5.125	5.233	6.384
	C	2.268	3.423	4.521

I = Infested; C = Control.

Table 2. Pyruvic acid, alpha-ketoglutaric acid and succinic acid dehydrogenase activity in the cotyledonary leaves of the seedlings raised from *A. flavus* stored seeds at varying RH (expressed as O.D.)

Dehydrogenase activity	RH%	I/C	O.D.
Pyruvic acid	60	I	0.03
		C	0.02
	70	I	0.04
		C	0.08
	80	I	0.05
		C	0.04
Alpha-ketoglutaric acid	60	I	0.03
		C	0.02
	70	I	0.04
		C	0.03
	80	I	0.05
		C	0.04
Succinic Acid	60	I	0.05
		C	0.04
	70	I	0.05
		C	0.04
	80	I	0.06
		C	0.05

I = Infested; C = Control.

Table 3. Peroxidase activity in the cotyledonary leaves of the seedling raised from *A. flavus* stored seeds (expressed as O.D.20 sec.)

Time interval (in sec.)	RH%					
	60		70		80	
	I	C	I	C	I	C
20	0.002	0.004	0.002	0.05	0.001	0.004
40	0.003	0.005	0.003	0.06	0.002	0.005
60	0.005	0.008	0.004	0.07	0.003	0.006
80	0.006	0.009	0.005	0.08	0.004	0.007
100	0.008	0.010	0.006	0.09	0.005	0.008
120	0.009	0.011	0.007	0.010	0.006	0.009
140	0.009	0.012	0.08	0.011	0.007	0.010
160	0.010	0.014	0.009	0.012	0.008	0.011

I = Infested; C = Control.

of seeds with *A. flavus*. Increase in RH level further augmented the respiratory parameters (Table 2 & 3).

Enhanced respiratory metabolism of diseased plants has been reported earlier¹⁰⁻¹² but no appreciable investigation was made in the seedlings due to storage of seed with fungi. Augmented dehydrogenase activity indicates stimulated reactions of Krebs's cycle in the seedling there by consumption of more O₂ by the extract of cotylednary leaves. Peroxidase has been reported as detoxifying enzymes. Involvement of toxin¹³ might be conjectured for enhanced respiration that may be responsible for hunger¹⁴ of the seedlings and producing weak plants.

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