J. Mycopathol. Res. 41(1) : 91-93 (2003)

Changes in carbohydrate content in seeds of *Schleichera oleosa* (Kusum) due to biodeterioration

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Seeds of one of the non-edible oil plant, Kusum (*Schleichera oleosa,* Sapindaceae) are of great use in Jharkhand area and its oil is used in burning lamps, varnishing, massage and medicine. Its oil cake is a good manure. The unsanitary and humid condition makes it prone to a faster biodeterioration due to several fungal inhabitants during one year of storage. The colonising fungi in the seeds used up some of the glucose, sugars and starches as carbon sources for meeting energy requirements in their prolonged association with the seeds. The glucose level dropped by as much as 48.9 per cent of the seed wt. Similaly total sugar also registered a loss, initially none to 40.4% in the long run. Starches reduced steadily in the stored seeds from 2.55 per cent to 1.25 per cent due to the association of internal mycodwellers.

Key words : *Schleichera oleosa,* oilseed, colonising fungi, carbon sources, mycodwellers

INTRODUCTION

Seed pathology is an up and coming area of plant pathology and has attained a great magnitude. Seeds of one of the non-edible oils, kusum (*Schleichera oleosa,* Sapindaceae) are of great use in burning lamps, varnishing, massage and medicine. Its oil cake is a good manure.

In the Jharkhand area kusum seeds are stored in gunny bags in village houses and godowns. In either case the condition is unsanitary and humid and conducive for fungal growth leading to a good scale destruction.

MATERIALS AND METHODS

Kusum seeds were obtained from the godown of Ranchi forest department for the prepration of oil cake from time to time. The work spread from June 1994 to May 1995. Glucose content was estimated by titration method using Fehling solutions. Total sugars and starch were estimated by colorimeter of Systronics (India) using anthrone as the reagent.

RESULTS AND DISCUSSIONS

The seeds of kusum were found to be infested with several fungi viz. *Aspergillus fumigatus, A. flavus, A. niger, Paecilomyces variotii, Fusarium solani* and *Mucor* sp. (Srivastava and Pandey, 2000)

The effect of continued fungal activity on the seed appeared in lowering glucose, total soluble sugars and starch contents and are elaborated in Tables 1-3.

Among the carbohydrates glucose was present in the healthy kusum seeds at 1.675 per cent, total sugars at 4.7 per cent and starch at 2.55 per cent. It was studied that during one year of storage i.e., upto May 1995 all these three registered losses due to prolonged fungal association. Glucose percentage dropped to 0.835, total sugars to 2.8 and starch to 1.25 per cent. Thus glucose recorded loss by 48.9 per cent, sugars by 40.4 per cent and starch by over 50 per cent. (1974) in shoot tissues of pigeon pea infected with *Fusarium oxysporum* f. sp. *udum.* Chattopadhaya and Nandi (1978) recorded carbohy-

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drate to *F. su bglutinum* infection. Loss in amount of glucose in fruits have been reported for tomato – *Drechslera australiens* (Kapoor and Tandon, 1970) ; tomato – *Alternaria solani* (Mehta *et al.*, 1975) ; banana – *Gloeosporium musarum* (Wang, 1960) and citrus – *Xanthomonas campestris* pv. *citri* (Vidyasekaran and Durairaj, 1971) host pathogen systems.

Similarly the depletion in the starch content is commemsurate with activation of starch degrading enzymes especially B-amylase (Schipper and Mirocha, 1977). The drop is due to the starch being used by the fungus as respiratory substrate (Baker, 1965; Wu, 1973). In pigeon pea seeds intested with *Aspergillus flavus,* Sinha and Prasad (1977) found depletion of starch. Likewise Bilgrami *et al.* (1979b) recored considerable decrease in the amount of starch in paddy seeds during 60 and 90 days of fungus infestation of an aflatoxin producing strain of *Aspergillus parasiticus* was reported by Bilgrami *et al.,* (1979a) Sinha *et. al.,* (1981) found considerable reduction in starch content of *Cajanus cajan* seeds infested with *A. flavus* and *A. niger.* However these seeds when infested with *Alternaria alternata* and *curvulavia lunata* showed a moderate reduction in the starch contents. On the contrary,

Table 1 : Amount of glucose present in 1 g of Kusum seed powder during one year of biodeterioration due to fungal attack. June 94 to May 95.

Month	Wt. (mg)	Percentage	Change of glucose %
Jan 94	16.75	1.675	—
Jul 94	16.25	1.625	– .05
Aug 94	16.25	1.625	– .05
Sep 94	15.75	1.575	– .1
Oct 94	14.9	1.49	– .175
Nov 94	14.3	1.43	– .245
Dec 94	13.1	1.31	– .365
Jan 95	13.0	1.3	– .375
Feb 95	11.9	1.19	– .485
Mar 95	10.3	1.03	– .645
Apr 95	9.5	.95	– .725
May 95	8.35	.835	– .84
SD	0.284		
SE	0.081		

Percentage change in glucose amount $\frac{1.675-.835\times100=50.2\%}{1.675}$

Cajanus seeds infested with *Fusarium moniliformae* and *Drechslera hawaiiensis* exhibited a minimum level reduction in starch contents. Later on Singh and Sinha (1985) confirmed that infestation of *Cajanus* seeds by *A. parasiticus* csused a considerable decline in their starch contents. Prasad (1989) reported a loss of starch in fungi infested seds of *Coriandrum indicum* and maximum loss in starch content was due to *Aspergillus flavus* followed by *Curvularia lunata.*

All these reports are concurrent to our findings. It is thus apparent that one year of seed infestation of *Schleichera oleosa* predominantly and jointly by *Aspergillsu fumigatus, A. flavus, A. niger, Fusarium solani, Paecilomyces variotii* and *Mucor* sp. causes biodeterionation of its seeds manifested in diminition of carbohydrate content.

Table 2 : Changes in the amount of soluble sugar present in 1 g of Kusum seed during one year of fungal attack. June 94 to May 95.

Month	Wt. (mg)	Percentage	Change of %
Jan 94	47	4.7	—
Jul 94	47	4.7	0
Aug 94	45	4.5	.2
Sep 94	44	4.4	– .3
Oct 94	41	4.1	– .6
Nov 94	40	4.0	– .7
Dec 94	37	3.7	– 1.0
Jan 95	35	3.5	– 1.2
Feb 95	34	3.4	– 1.3
Mar 95	32	3.2	– 1.5
Apr 95	30	3.0	– 1.7
May 95	28	2.8	– 1.9
SD	0.663		
SE	0.191		

Table 3 : Changes in the amount of starch present in 1 g of Kusum seed powder during one year of fungal attack. June 94 to May 95.

Month	Wt. (mg)	Percentage	Change of glucose %
Jan 94	25.5	2.55	—
Jul 94	24.0	2.4	– .15
Aug 94	22.3	2.23	– .22
Sep 94	22.0	2.2	– .25
Oct 94	21.6	2.16	– .39
Nov 94	19.9	1.99	– .56
Dec 94	17.9	1.79	– .76
Jan 95	17.1	1.71	– .84
Feb 95	16.3	1.63	– .92
Mar 95	14.8	1.48	– 1.07
Apr 95	12.9	1.29	– 1.26
May 95	12.5	1.25	– 1.3
SD	0.430		
SE	0.124		

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(Accepted for publication December 08 2002)