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CHANGE IN OIL CONTENT OF OIL YIELDING SEEDS DUE TO STORAGE FUNGI

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Maximum loss of oil was caused by *A. flavus* followed by the remaining fungi behaving nearly alike except *F. moniliforme* which caused maximum loss of oil of sunflower seed. Lipolytic enzyme activity was maximum in *A. flavus* followed in succession in *F. moniliforme*, *A. niger* and *A. tenuissima*.

Keywords : Lipolytic enzyme activity; Oil content; Oil yielding seed; Storage fungi.

The storage fungi are unequivocally found associated with all sorts of seeds[1] and depending on the storage condition, quantitative reduction of food reserve of the seed has been observed[2,3]. Earlier, the storage fungi of some oily seeds were reported besides the effect of the former on the seed germination and seedling diseases[4]. The present note deals with the change in oil content of common oily seeds due to storage fungi and their lipolytic enzyme activity.

Out of the total isolates from the stored seeds of sesame (*Sesamum indicum* L) var Kanke White, groundnut (*Arachis hypogea* L) var BGI, sunflower (*Helianthus annuus* L) var Armavir Kij (EC 68415) and castor (*Ricinus communis* L) var EB 6-A with farmers, four spp of fungi i.e *Aspergillus flavus* Link ex Fries, *A. niger* var Tieghem, *Alternaria tenuissima* (Kunze ex Fries) Wiltshire and *Fusarium moniliforme* Sheldon were selected based on their frequency and infestation to the noted seeds[5] using spore suspension at the rate of $1x10^4$ spores per ml/25g of seed. The infested seedlot in quadriplicate was stored over saturated solution of ammonium sulphate in sealed desiccators to maintain 80% RH in consistent with the RH in the rains, for a period of 30 days at 30±1°C. After the expiry of storage, one lot was powdered and set for extraction of oil with 100 ml of petroleum ether, B.P. 40-60°C in Soxhlet extractor for a period of 3 hr warming on sand bath while the remaining lots were dried at 70°C for 72 hr and cooled over fused calcium chloride to the constant weight the mean of which was noted. Ether was removed by keeping the extracted oil in preweighed beaker of 100 ml capacity. The exact weight of the oil was calculated after deducting the weight of the beaker and per cent loss of oil was calculated with the help of the weight of oil extracted form the dried control lot.

It is established that the lipolytic enzyme activity of fungi results in the hydrolysis of the fat into fatty acids and glycerol. *In vitro* lipolytic activity was determined adopting Prasad[6] that has been modified the original method[7].

The method requires a basal medium consisting of Difco peptone 10.0g, sodium chloride 0.5g, hydrated calcium chloride 0.1g, agar 20g and distilled water 1000 ml. The pH of this medium was adjusted to 6 with 0.1 N HCl and NaOH and as substrate sarbitol monolaureate (= Tween 20) was used. Both were separately autoclaved at 15 psi for 15 min. One ml of Tween 20 per 100 ml of the basal medium was mixed, stirred, cooled and 20 ml was poured in sterilized petri dishes of 10 cm diameter. After solidifying, the test fungi noted above, were inoculated in the centre of the medium with the tip of sterilized and cooled chrome wire needle. The culture was incubated at 25±1°C for 7 days. Around the colony, the zone of white crystal formation was measured in mm of scale between the extremity of colony and the last margin of the crystal formation at five points in culture of one petri dish. In this way the zone was recorded as mean of three petri dishes.

Maximum loss (%) in oil content of the seed was recorded due to *A. flavus* followed by the remaining fungi behaving nearly alike except *F. moniliform* which caused maximum loss of oil of sunflower (Table 1). The lipolytic enzyme activity was observed to be maximum in *A. flavus* followed in succession by *F. moniliforme*, *A. niger* and *A. tenuissima*. No activity was recorded in the control (Table 1).

The loss of oil content of the seed has earlier been reported in radish[3], mustard[8] and coriander[9]. Lipolytic enzyme activity of seedborne storage fungi of coriander

Table 1. Per cent loss in oil content of the seeds due to seedborne storage fungi and their lipolytic enzyme activity.

	Storage fungi			
Oil yielding seeds	*A. flavus*	*A. niger*	*A.tenuissima*	*F. moniliforme*
Mustard	33.3	25.2	23.6	5.5
Sesame	19.4	11.8	11.6	4.2
Groundnut	18.6	11.6	9.3	3.9
Sunflower	11.7	5.4	5.9	9.2
Castor	5.5	4.2	3.9	4.5
Lipolytic Enzyme activity (in mm scale)	22.0	16.0	12.0	18.0
	control -00 (No activity)			

has earlier been observed. This enzyme activity on one hand causes reduction of oil in the seed, on the other, the pH of the seed tissue may be altered due to fatty acids released unbalancing the regulated biochemical steps in the seed and the seedlings.

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References

1. Christensen CM 1957, Deterioration of stored grains by fungi. *Bot. Rev.* **23** 108-134
2. Bilgrami KS, Prasad T and Sinha RK 1979, *Changes in nutritional components of stored seed due to fungal association*. Today and Tomorrow Printers and Publisher, New Delhi- 110005
3. Prasad BK, Sao RN and Narayan N 1989, Deterioration of radish seed in storage due to *Aspergillus flavus* : change in oil, free fatty acid and glycerol. *J. Indian Bot. Soc.* **68** 193
4. Singh Ajay Kumar, Singh RN, Hussain Md Azhar and Prasad BK 2003, Effect of storage fungi of oil yielding seeds on germination and seedling diseases. *J. Phytol. Res.* **16** 163-168
5. Sao RN, Singh RN, Narayan N, Kumar S and Prasad BK 1989, Seedborne fungi of vegetables belonging to Brassicaceae. *Indian Phytopath.* **42** 538-543
6. Prasad BK 1979, Enzymic studies of seedborne fungi of coriander. *Indian Phytopath.* **32** 92-94
7. Sierra G 1957, Antonie Van Leeuwenhoek **23** 15-22
8. Kumar S 1988, *Seedborne fungi of stored mustard* (*Brassica campestris* L), their significance and control. Doctoral thesis, Magadh University, Bodh Gaya- 824234
9. Prasad BK, Shanker U, Narayan N, Dayal S and Kishor A 1988, Physico-chemical changes in food reserve of coriander seed due to storage moulds. *Indian Phytopath.* **41** 386-388