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Effect of Temperature on Incidence of Storage Fungi of Some Oil Seeds

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The seed mycoflora associated naturally with oil seeds causes seed deterioration making them unfit for consumption and oil extract. The seed borne fungi inhibits seed germination, seedling emergence and causing diseases to crop plants. The major factor affecting the spoilage of stored oil seeds by moulds, moisture content and temperature. The seed mycoflora of oil seeds like soybean (JS-335, Prasad and Puja), Safflower (Tara, Bhima and Sharda) and Niger (Local, N-8 and Ootcamand) was detected by standard blotter method and agar method. The most dominant fungi detected on three varieties of soybean were *Rhizopus stolonifer, Curvularia lunata, Aspergillus niger, Alternaria alternata,* from Safflower *Alternaria tenuis, Aspergillus niger, Rhizopus stolonifer* and from Niger *Alternaria tenuis, Aspergillus niger, Rhizopus nigricans.* It was found that temperature invariably affect the quality of the seeds in the storage. The percentage incidence of fungi found varies at different temperatures. The temperature 30°C was found to be more favorable for the incidence of fungi on oil seeds. A very less percentage incidence of fungi was found at 10°C and 40°C temperature tested for all the varieties of Soybean, Safflower and Niger.

Key words: Soybean, safflower, Niger, Temperature, seed mycoflora.

Seed borne fungi cause losses in terms of seed quality and quantity in all oil seed crops. These fungi also reduce germination of the seed. They are responsible for seed rot, Seedling blight, foliar infection and pod blight diseases (Lambate, *et al.,* 1969, Agarwal *et al.,* 1972, Agarwal, 1974). The losses oil seed and grains can be attributed the unhygienic storage condition and high moisture level of seed or absorption of moisture during storage.

A change in temperature has marked effect on the present occurrence of fungi on oil seeds. The associated mycoflora of seeds may be pathogenic, weak parasites of saprophytes. Seed transmitted pathogens cause disease at various stages of growth of crop plants from germinating seeds up to crop maturity. Certain pathogens transmitted through seeds area able to cause epiphytotic even when few infected seeds used for sowing in the field in suitable temperature and moisture condition. Soybean, safflower and Niger are important oil seed crops cultivated over several parts of the world both in tropics and subtropics. These oil seeds are affected by number of diseases caused by fungi, bacteria and viruses. Among these fungal diseases are more prevalent. Presence or absence of mycoflora on seed surface is one of the important aspects that determine the quality

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of seeds. The major factors causing seed rot are storage fungi, insect and rodents, temperature and humidity. Out of these factors temperature and humidity are being the main determinants. High temperature can lead to chemical deterioration. The ageing process in oil seeds can cause a major loss in oil quality in terms of colour, free fatty acids, ioden and other biological values.

In the present investigation attempt is made to determine the effect of storage temperature on incidence of seed mycoflora of different varieties of Soybean, Safflower and Niger.

MATERIAL AND METHODS

The samples of oil seeds were obtained from the oil seed research station, Latur. The following cultivars were investigated for seed mycoflora in relation to storage temperature *Glycine max* Linn (Soybean) cv. JS.335, cv Prasad, cv, Puja, *Carthamus tinctorius,* Linn (safflower) cv. Tara, cv. Bhima, cv. Sharda. *Guizotia abyssinca*, cass (Niger) cv. Local, cv. N-8m cv. Ootacamund.

Detection of seed mycoflora

Detection of seed mycoflora was carried out by standard blotter method. (ISTA, 1966). 400 seeds of each sample were tested. 25 seeds were plated in 9mm diameter petridish containing 2 layers of moist blotter paper using sterilized water (pH 7.2). The plates were incubated at different temperature ranges from 10°C to 40°C for 7 days. Under cool white florescent light with alternating cycles of 12 hours light and 12 hours darkness. Seeds were examined under the stereoscopic binocular microscope. The percentage incidence of seed mycoflora was recorded.

RESULTS AND DISSCUSSION

The seeds of 3 varieties of Soybean, Safflower and Niger were investigated for incidence of mycoflora. In all 14 fungal species found to be associated with these cultivars. *Aspergillus niger* found on all type of seeds followed by *Rhizopus stolonifer*, *A Niger* appear individually and also in association with *R. stolonifer* and *Aspergillus flavus.* The fungi isolated from safflower Tara, Bhima and Sharada were *R. stolonifer, A niger, A. flavus, Pencillium citrinum, Rhizoctonia bataticala, Alternaria tenuis, Cladosporium herbarum* and *Fusarium moniliforme, Aspergillus fumigatus.* Out of these varieties Sharda[4] showed less number of fungal species then Bhima[7] and Tara[8].

Table 1. Incidence of storage fungi on different oil seeds.

Seed mycoflora	Seed sample								
	Soybean			Safflower			Niger		
	JS-335	Prasad	Puja	Tara	Bhima	Sharda	Local	N-8	Oota-comand
Alternaria alternata	+	+	+	-	-	-	-	-	-
A. tenuis	+	-	-	+	+	+	+	+	+
Aspergillius flavus	+	-	-	+	+	+	-	-	-
A. fumigatus	-	-	-	-	+	-	-	-	-
A. niger	+	+	+	+	+	+	+	+	+
Caldosporium herbarum	-	-	-	+	+	-	-	-	-
Curvularia lunata	+	+	+	-	-	-	+	+	-
Fusarium moniliforme	+	+	-	+	-	-	-	+	+
F. oxysporum	-	-	+	-	-	-	-	-	-
Macrophomina phasealina	+	+	-	-	-	-	-	+	+
Penicillium citrinum	+	+	-	+	+	-	-	+	-
Rhizoctonia bataticala	+	+	-	+	-	-	-	-	-
Rhizopus nigricans	+	+	-	-	-	-	+	+	+
R. stolonifer	+	+	+	+	+	+	-	+	+

The fungi isolated from soybean varieties like JS-335, Prasad varieties likeJS-335, Prasad and Puja were *R. stolonifer, A. niger, A. Flavus, P. citrinum, Curvularia lunata, Fusarium oxysporum, Rhizopus nigricans, R. bataticala, A. tenuis Macrophomina phasealina, F. moniliforme* out of these 3 varieties JS-335[11] showed more number of fungal species followed by Prasad[9] and Puja[5].

The incidence of storage fungi on the

Table 2. Effect of temperature percentage incidence of seed mycoflora of *Glycine max* (Soybean).

Temp (°C)	Percentage incidence of seed mycoflora of soybean					
	Blotter method			Agar method		
	JS 335	Prasad	Puja	JS 335	Prasad	Puja
10	3	6	3	4	8	5
15	14	19	15	20	25	21
20	33	33	33	39	40	40
25	50	60	55	57	65	61
30	69	75	71	75	81	79
35	60	67	64	68	74	72
40	54	60	59	60	68	65

Table 3. Effect of temperature percentage incidence of seed mycoflora of *Carthamus tinctorius* (Safflower).

Temp(°)	Percentage incidence of seed mycoflora of safflower					
	Blotter method			Agar method		
	Tara	Bhima	Sharda	Tara	Bhima	Sharda
10	5	4	6	7	5	8
15	16	18	19	23	22	25
20	30	36	35	37	45	41
25	58	58	56	67	67	63
30	70	75	71	77	83	80
35	65	68	63	71	76	72
40	60	60	57	65	69	68

Table 4. Effect of temperature percentage incidence of seed mycoflora of *Guizotia abyssinica* (Niger)

Temp (°C)	Percentage incidence of seed mycoflora of niger					
	Blotter method			Agar method		
	Local	N-8	Ootacamand	Local	N-8	Ootacamand
10	7	58	8	9	7	10
15	18	20	22	22	25	27
20	32	35	38	40	43	45
25	55	60	63	63	67	70
30	72	77	77	80	83	85
35	67	68	70	73	75	78
40	60	60	61	66	67	67

varieties of Niger like local, N-8, ootacamand were *R. stolonifer, A. niger, P. citrinum, R. nigrician, A. tenuis* and *M. phaseolina* . Out of these varieties local 5 showed less number of fungi than N-8[8] and ootacamand[6].

In the present investigation two incubation methods like blotter method and Agar plate method were employed to assess the efficiency in detection of seed borne fungi. Both the methods were found versatile in exhibiting spectrum of fungi. Maximum number of fungi were obtained by these methods. The applicability for detection of fungi by these culture test in relation to the fungi has been reported by several workers (Agarwal and Singh, 1974, Jhamaria *et al.,* 1975, Anilkumar and Shantha, 1976, Kanwar *et al.,* 1979). Both the methods revealed the highest percentage incidence of seed mycoflora of soybean; variety JS-335 (69%), Prasad (75%) and Puja (71%) by blotter method and JS 335 (75%) Prasad (81%), Puja (79%) at 30°C, temperature were as less percent incidence of seed mycoflora found at 10°C temperature. It is clearly evident from these results that temperature 30°C is the optimum temperature 30°C is the optimum temperature for detection of all the 14 fungi from soybean seeds. Similarly the percentage incidence of seed mycoflora of Niger at 30°C temperature was found maximum in all the three variety of Niger and Safflower. Therefore the optimum temperature for detection of all the 14 fungi from 3 varieties of Safflower and Niger is 30°C. It is clear from result that storage of oil seeds like Soybean, Safflower and Niger at low temperature prevent the deterioration of oil seeds and can incerease the storage period. While more deterioration of seed can be caused and highest loss of germiability may be caused at 30°C. Similarly it is reported by (Nandi *et al.,* 1982) studied the seeds of Sesame, Mustard, linseed and found that highest loss of germiability is noted at RH 90% and temperature 30°C.

The two culture methods i.e., blotter and agar methods were used suitably in assessing percentage incidence of fungi from varieties of Soybean, Safflower and Niger. Both the methods yielded 14 different fungal species. The applicability of these methods in relation to fungi has been reported by Several authors (Agarwal and Singh, 1974), Kannaiyan *et al.,* 1974, Raut, 1974, Chauhan and Jasmit 1975, Zad 1987, Kanwar*, et al.,* 1979).

The method used in seed health investigation vary according to the porpoise of the study for quarantine porpoises the method should be highly sensitive for keeping quality of seed against deterioration. The method used widely differ and dependent on the nature of damage (Baker, 1972, Tempe, 1962 and Raenath, 1977) out of the incubation methods used for incidence of seed mycoflora Agar method clearly indicate and efficient method however blotter method is the simple method for isolation of seed borne fungi. It is reported earlier that blotter test has gained immense popularity in seed health studies on account of its simplicity.

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