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ORIGINAL ARTICLE

EFFECT OF STORAGE PERIOD ON INCIDENCE OF FUSARIUM SPECIES AND BIODETERIORATION OF SOYBEAN

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Research Guide.

Abstract:

The incidence of fusarium from different storage period was studied on PDA and 14 Fusarium species were isolated. The incidence of F. roseum, F. dimerum, F. oxysporum, F. equiseti and F. nivale was observed to be maximum at 12 months of storage period.

The bio-deterioration of soybean JS80 variety was studied with respect to protein , fat and dry weight change. The degradation of protein was found to be maximum in presence of F. roseum and the maximum degradation of fat is observed. The maximum loss in dry weight is observed in case of F. nivale.

KEYWORDS:

Fusarium, incidence, Bio-deterioration.

INTRODUCTION:

Many developing countries including India have been trying to increase seed production in recent years. Unfortunately, due to lack of improved post-harvest preservation technique, a large portion of annual yield gets lost in storage, and these losses have been attributed partly to the microbial action in storehouses. According to Mc Kee (1995) and Hasheem and Alumri (2010) many agricultural products may be exposed to a wide range of microbal contamination during pre and post harvest. Such contamination may occur during storage, distribution, sale or use. Seeds are known to be colonized by varied types of fungi (Harman 1983). Nergaurd (1977) described many seed borne pathogens and Richardson (1979) listed more than 1500 fungi associated with seed borne diseases.
The seed borne inoculums of these microorganisms may become the starting point for serous diseases.

Singh and Shukla (2005) assessed fungal infestation in fresh and stored seeds of Shorea robusta and observed high incidence of fungi in stored seeds. Singh et.al. (1999) observed wide variability in seed mycoflora of stored and freshly collected seeds. Stored seeds in general had greater number of fungi as compared to freshly collected seeds.

Fungi growing on stored grains, can reduce the germination rate along with loss in the quantum of carbohydrate, protein and total oil content, induces increased moisture content, free fatty acid content and enhancing other biochemical changes (Kashinath and Subrata 2002). Pre and post harvest bio-deterioration and spoilage of grains, vegetables, fruits and agricultural produce due to infestation by insects and microorganisms may cause losses of up to 100% Chandler (2005). Nielsen and Rios (2000) and Bennett and Klich (2003) reported spoilage and poisoning of food by fungi is a major problem especially in developing countries and production of allergenic compounds which lead to qualitative losses. Embaby E.M. and Abdel Galil (2006) reported loss of fat and protein in legume seeds by Fusarium oxysporum. By observing all these facts here it is an attempt to know and assess the impact and bio-chemical loss caused by fusarium species.

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MATERIALS AND METHODS:

1)Collection of seed samples and detection of Fusarium species

Oil seeds samples were collected as per the method described by Neergaard (1977). The seed borne fusarium species were isolated by using standard Agar plate method (APM) as recommended by International Seed Testing Association, ISTA (1966), Neergaard (1977) and Agarwal (1981).

2)Bio-deterioration of Soybean

The soybean seeds were washed with distilled water and surface sterilized with 0.1% HgCl2 solution and again washed with distilled water. The seeds were distributed into pre-sterilized conical flasks (25gm/flasks). The test Fusarium species were inoculated in each conical flasks and were incubated at room temperature for 15 days. Then the seeds were thoroughly washed under running tap water in order to remove mycelial growth from their surfaces. Subsequently, the seeds were dried at 600C for 48 hours and crushed into fine powder for the estimation of protein, fat and dry weight. The seeds without incubating the spore suspension of Fusarium species served as the control.

Determination of crude protein and fat was done according to the methods of SOPA (2003). To know the loss in dry weight, the sample was dried in Mechanical mill until the sample passes completely through a sieve of appropriate aperture size and the loss in dry weight was calculated by following formula

$$\text{Dry weight} = \frac{100\,(M1-M2)}{M1-M}$$

Where, M1 = Mass in gm of the material before drying, M2 = mass in gm of the dish with the material after drying and M = mass in gm of the empty dish.

RESULTS AND DISCUSSION:

The incidence of fusarium from different storage period was studied on PDA and the results were noted in table 1. According to the results 14 Fusarium species were isolated. The percent incidence of fusarium species was maximum according to the increase in storage period and the same was observed by Dharurkar (2007) and Kesare (2008). The incidence of F. roseum, F. dimerum, F. oxysporum, F. equiseti and F. nivale was observed to be maximum at 12 months of storage period. The incidence of F.clamydosporum, F. graminearum, F.moniliforme, F. napiforme and F. oxysporum was observed at all the tested storage periods. The results of incidence were correlates with findings of Nasir (2003), Tabue and Stefan (2004) and Ramesh and Marihal (2006).

The bio-deterioration of soybean JS80 variety was studied and the results were tabulated in table 2. The degradation of protein was found to be maximum in presence of F. roseum and it is lowest in case of F. nivale. The maximum degradation of fat is observed in case of F. nivale and it is lowest in case of F. dimerum. The degradation of protein and fat content by fusarium species were also observed by Bhattacharya and Raha (2002), Manoharachary and Kunwar (2006) and Gorgile (2011). The maximum loss in dry weight is observed in case of F. nivale and it is followed by F. oxysporum, F. roseum and F.equiseti respectively.

Table 1: Incidence of seed borne fusarium and storage period

Sr. No	Fungi	% Incidence				
		One Month	Three Month	Six Month	Nine Month	Twelve Month
1	*F.clamydosporum*	03	06	10	14	12
2	*F. culmorum*	00	00	05	18	18
3	*F. dimerum*	00	00	10	15	32
4	*F. equiseti*	00	00	05	17	30
5	*F. graminearum*	08	10	10	14	18
6	*F.moniliforme*	06	10	20	20	25
7	*F. napiforme*	08	10	12	12	15
8	*F. nivale*	00	00	03	35	28
9	*F. oxysporum*	10	15	22	28	35
10	*F. poae*	00	00	00	03	10
11	*F. roseum*	00	08	18	30	38
12	*F. semitectum*	00	00	06	24	18
13	*F. solani*	00	15	17	20	20
14	*F. udum*	00	00	10	14	20

Table 2: Bio-deterioration of soybean Js 80 variety by different fusarium sps.

Fungi	Protein	fat	Dry weight
Fusarium equiseti	32.26	5.13	7.25
Fusarium nivale	32.65	3.14	5.20
Fusarium oxysporum	31.64	5.74	6.77
Fusarium roseum	30.41	8.76	6.89
Fusarium dimerum	32.06	6.74	8.81
Control	36.18	10.58	9.83

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