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Seed Health Status of Farmers Saved Sesame Seed under Kalahandi District of Odisha, India

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A B S T R A C T

Seed health testing to detect seed-borne pathogens is an important step in the management of crop diseases. Laboratory experiments were carried out at College of Agriculture, Bhawanipatna during Kharif, 2018 to investigate the planting value of the seed and extent of seed-borne fungal pathogen problems from farmers saved seeds in Western undulated Zone of Odisha. A total number of six seed samples of Sesame were collected from farmers saved seeds in M. Rampur, Karlapada, Bhawanipatna, T. Rampur, Kesinga and Narla block of Kalahandi districts. Each sample was physically inspected and pure seeds were separated from abnormal seeds and inert matter. Seed samples collected at T. Rampur and Kesinga were of high quality compared to seed samples collected at Karlapada, M.Rampur, Bhawanipatna and Narla. Seed moisture content and pure seeds ranged from 9.3- 11.2% and 82-93% respectively. In seed health study, six fungi namely *Fusarium* spp., *Macrophomina phaseolina*, *Curvularia* sp. *Aspergillus flavus*, Penicillium sp., and *Alternaria* sp. were found in the seed samples of farmers saved seeds. Among the fungi, prevalence of *Fusarium*, *Macrophomina*, *Curvularia*, *Alternaria* were maximal ranging from 23.9% - 35.4% which was followed by *Aspergillus flavus*, *Penicillium* spp. (18.5% to 19%). The percentage of fungal seed infection was higher in seed samples collected at Bhawanipatna and Narla with infection rate of 33.1 % &34.2% respectively and lowest for seeds sample collected at T. Rampur and Kesinga with infection rate of 15.5 & 17.3% respectively. All the six fungal pathogens were more prevalent in farmer saved seed and it is recommended that seed should be well dried to keep seed moisture content within the 9.0% and treated with appropriate fungicides prior to planting inorder to have better seed quality.

Introduction

Sesame (*Sesamum indicum* L.) is one of the important oil seed crops where India and China are the largest producers. Sesame crop is tolerant to drought-like conditions, growing where other crops fail. Sesame has one of the highest oil contents (46-50%) of any seed with a rich, nutty flavor, it is a common ingredient in cuisines across the world like other nuts and foods. It has the highest antioxidant content among plant oils, able to penetrate the skin and enter the blood stream rapidly through the capillaries and assists with

quickly neutralizing oxidative stress. Now-a-days the sesame seeds which are stored by the farmers after harvest are going to lose its germination, vigour and infected by different fungi. An attempt has been made to study the seed quality and health status of Sesame seeds already saved by the farmers in the western undulating zones of Odisha particularly in different blocks of Kalahandi, Odisha during Kharif 2018.

Materials and Methods

A total of six number of sesame seed samples were collected from the farmers field after the harvest of the crop in different locations of Kalahandi districts names viz. M. Rampur, Karlapada, Bhawanipatna, T. Rampur, Kesinga and Narla, during the harvest seasons of Kharif 2018. The experiments were conducted at Plant Pathology and Seed Science and Technology laboratory, College of Agriculture, Bhawanipatna. All the samples were subjected to seed quality status and seed health status by using blotter techniques, seed germination status by paper towel method and vigour index was calculated based on seedling length (ISTA 2006). Seven grams of sesame seeds was taken from each sample for conducting the physical purity (%) test.

Evaluation of seed germination and seedling vigour

100 seeds having four replicates were placed in wet blotter towels for a period of six days for germination test according to ISTA under seed germinator. On sixth day, the wet blotter towels were unrolled and the root and shoot lengh of the normal seedlings were measured in centimeter, percentage of seed germination was also recorded on the basis of its all essential structures present on those seedlings. The vigour index of the seedlings was calculated as mean length of root and shoot (cm.) x germination percentage (Abdul–Baki and Anderson, 1973). The seed moisture and physical pure seed percentage were determined (ISTA 2006).

Evaluation of seed for mycoflora

About 400 seeds of each collected seeds were randomly picked out and were subjected to standard blotter method as recommended by ISTA. The seeds were incubated at BOD instrument (REMI CI-10plus) for a period of 10 days 25±1^{O}C under 12 hour alternate cycles of light and darkness. After incubation fungi association with seeds were observed under different magnifications using Research microscope (Catcam model No. 130) for its occurrence of myco-flora. The fungal species under this study were isolated under PDA media and slides were prepared for proper identification with the help of available literature (Burnet and Hunter, 1972 and Ellis, 1976). The percent incidence of seed myco flora was also recorded and the data were tabulated. The data of all tests were analyzed statistically for analysis of variance using OPSTAT software.

Results and Discussion

The farmers' saved seed differed significantly among themselves for both germinability and vigour index. Seeds of T. Rampur were exhibited highest average germination value (83.5%) is statistically *at par* with the Kesinga seeds (82.0%) was only due to having its adequate seed moisture content maintained its seed quality norms followed by Karlapada seeds (71.0%), M.Rampur (68.5%) and Narla (66.5%). At that same time the seedlings with average highest vigour index value was estimated in Kesinga (1262.85) revealed statistically *at par* with the T. Rampur (1227.62) as having higher germination percentage with longer root and shoot length followed by Karlapada seed (914.4), Bhawanipatna (880.35), M. Rampur

(828.8) and Narla (758.12). The important cause of poor seed quality of farmers saved seed is improper techniques followed during seed production, post-harvest operation, storage, handling at the time of seed processing, transportation and also lack of knowledge on chemicals and proper dosage to treat the seeds before storage up to next sowing time (Khare, 2000). Among the seed mycoflora six fungal species were recorded to be associated with the seed samples from different blocks of Kalahandi. The identified six fungal species were *Fusarium*, *Macrophomina*, *Curvularia*, *Alternaria*, *Aspergillus* and *Penicillium*. The percentage of total seed borne infection of various fungi in different locations ranged from 15.3–34.2 %. The highest total fungal prevalence was recorded from the seeds of Bhawanipatna (34.2%) and lowest fungal prevalence from T. Rampur (15.5%). Bhawanipatna (34.2%) and Narla (33.1%) showed highest percentage of seed mycoflora infection which were statistically at par and least infection noticed from farmer saved sesame seeds of T. Rampur (15.5%) and Kesinga (17.3%).

The least infection of T. Rampur and Kesinga was due to having lowest seed moisture percentage 9.3% and 9.7% respectively which is nearer to minimum seed certification standards for Sesame i.e. 9.0% whereas the highest seed myco flora observed in Bhawanipatna and Narla due to highest seed moisture content i.e., 11.8 % and 11.2 % respectively with improper crop management and storage of seed without any suitable chemicals for seed treatment. Infection by *Fusarium*, *Macrophomina*, *Curvularia*, *Alternaria*, *Aspergillus* and *Penicillium* was 33.7%, 29.1% 35.4%, 23.9%, 19.0% and 18.7% respectively was noticed from all farmers' saved seed of different blocks (Table 1 and 2).

Table.1 Seed quality status of farmers' saved sesame seed collected from western undulating zone

Farmers' seed	Moisture (%)	Physical Pure seed (%)	Germination (%)	Shoot Length (cm)	Root Length (cm)	Vigour Index	% seed myco flora
M.Rampur	10.5	83.7	68.5	7.8	1.95	828.8	30.8
Karlapada	10.2	86.5	71	8.3	2.08	919.4	28.9
Bhawanipatna	10.8	**82**	**64.2**	8.9	2.23	880.35	34.2
T.Rampur	**9.3**	91.5	83.5	9.4	2.35	1227.62	**15.5**
Kesinga	9.7	93	82	9.75	2.44	1262.85	17.3
Narla	11.2	85	66.5	**7.3**	**1.83**	**758.12**	33.1
SE(m)±	0.048	0.864	0.629	0.120	0.068	14.784	0.594
C.D (0.05)	0.146	2.603	1.896	0.363	0.206	44.565	1.789
C.V	0.939	1.986	1.733	2.809	2.846	3.019	4.461

Table.2 Seed mycoflora association in farmer saved sesame seeds

Genotypes	*Fusa.*	*Macro.*	*Curv.*	*Alt.*	*Asp.*	*Pen.*	T O T A L
M.Rampur	7.2	8.4	5.3	3.2	4.1	2.6	**30.8**
Karlapada	5.8	6.8	6.4	3.6	3.4	2.9	**28.9**
Bhawani patna	8.9	3.2	7.4	7.5	3.8	3.4	**34.2**
T.Rampur	3.2	2.4	3.7	2.1	1.8	2.3	**15.5**
Kesinga	1.8	2.4	4.4	2.3	2.6	3.8	**17.3**
Narla	6.8	5.9	8.2	5.2	3.3	3.7	**33.1**
TOTAL	**33.7**	**29.1**	**35.4**	**23.9**	**19**	**18.7**	

(Fusa: Fusarium sp., Macro.:Macrophomina phaseolina, Curv.: Curvularia lunata,Alt.:Alternaria sesame, Asp.: Aspergillus flavus, Pen.: Penicillium sp.)

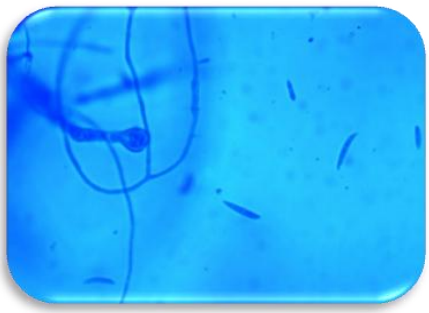

Plate 1 :*Fusarium* sp.

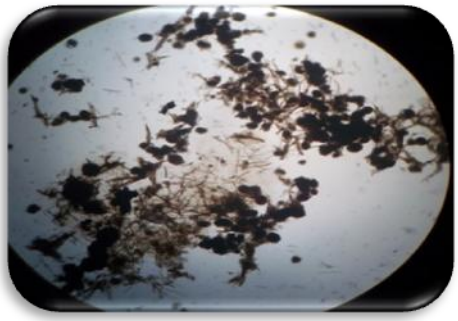

Plate 2 :*Macophomina phaseolina*

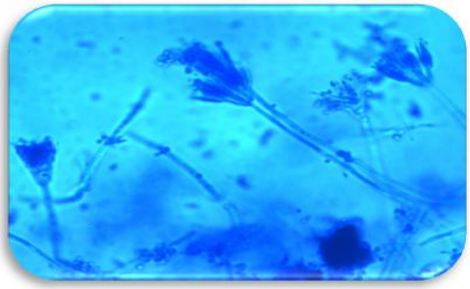

Plate 3 :*Penicillium sp.*

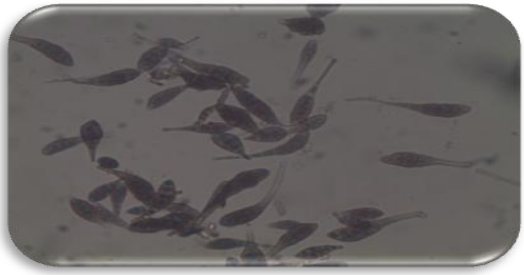

Plate 4 :*Alternaria sesame.*

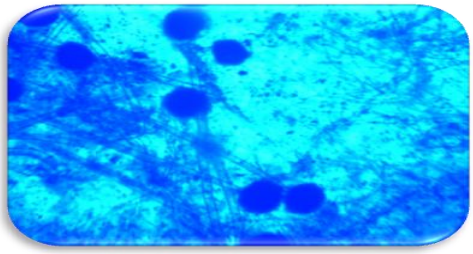

Plate 5 :*Aspergillus* flavus

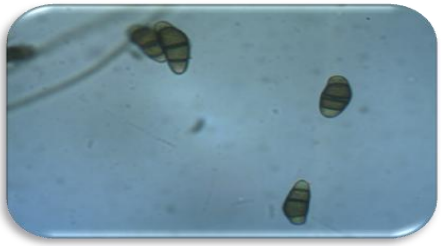

Plate 6 :*Curvularia lunata*

Highest infection of *Curvularia lunata* (35.4%) and *Fusarium sp.* (33.7%) was found in farmers' saved seed whereas lowest infection recorded by *Penicillium* sp. (18.7%) and *Aspergillus flavus* (19.0%). All the six fungal pathogens were more prevalent in farmers' saved sesame seed. The germination percentage and vigour index reduced on the basis of increased incidence of seed mycoflora in different farmers saved seed (Patharkar *et al.,* 2013). The association of fungi with sesame seed has also been reported by a good number of workers (Shakir and Ansar, 1992; Altaf *et al.,* 2004; Srikantappa *et al.,* 2009; Nayyar *et al.,* 2014 and Khamari *et al.,* 2018). Presently, 1-2% of total sesame seed used for sowing in this area is certified even rest seeds are of their own saved seed and it has been observed that all farmers saved seeds are generally substandard towards its seed quality (Praveen Kumar *et al.,* 2001).

From the present investigation it can be concluded that the farmers' saved seeds of Bhawanipatna and Narla revealed highest moisture (%), lowest germination (%) and high fungal infection, while minimum number of seed mycoflora association in farmers saved sesame seed resulted higher in germination and root-shoot length, lower in diseased seedlings consequently leading to high vigour index.

All the farmers' saved sesame seeds collected from different location of Kalahandi were the below standard. It is therefore, suggested to provide proper training programme to the farmers' of this location of Kalahandi districts for better crop management, seed treatment for dis-infection and proper seed storage of their produced Sesame seeds. This will help to improve the health of seed at their level. Use of healthy as well as quality seed will be a substantial impact on sustainability of food security for the farmers' community.

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