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CHAPTER - IV

DISCUSSION

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After threshing, the seeds are stored in proper condition as a future food as well as some are stored for the formation of other life. Majority of the seeds are stored in godown in large scale to solve the today and tomorrow's food problem. At Taluka and District places, there are well constructed seed godowns to conserve the cereal grains. At the time of storage the seeds are well sundried and kept in number of bags. If seeds are not well dried perhaps there is possibility of attack of micro-organisms due to moisture present in seeds. Usually the stored seeds contain atleast 4% moisture. Over drying causes injury to embryo. More than 12% moisture favours growth of micro-organisms. Seeds carry several destructive pathogens along with them causing severe diseases on crops raised from them whenever used for cultivation. If infected seeds are consumed they cause diseases to human beings and domestic animals. Examples of such diseases are Ergot of Bajara, and Scab of Wheat. Consumption of ergot mixed bajara grains is responsible for diseases in domestic animals and man. Similarly, it is reported that consuming scabbed wheat even in small quantities cause food poisoning.

Attack of micro-organisms to seed in storage decreases the food value (content) and such seeds are dangerous for consumption. In some cases seed infection reduces the market value of the produce. Mixing of normal seeds with affected seeds lowers their

market value; for example; mixing of normal wheat with affected black point diseased wheat lowers the market value. Similarly, wheat grains contaminated with bunt (upto 0.5%) gives discoloured (some what blackened) flour thus making it unacceptable.

The pathogens may be just on the surface of seeds, and such seeds are said to be infested. Pathogen when lie within the seed tissue, such seeds are said to be infected. Infestation occurs during harvesting and threshing of grains while infection of seeds occure on the crop itself. The spores falling on the infloresence or pods germinate and penetrate into the seeds. Within seed infections may be confined to the superficial layers or they may penetrate into deeper layers. The penetration may again be partial or extensive. This depends upon the parasitic properties of the pathogen or on the phase of ripening of seed or on the environmental conditions.

Pathogens are carried on seeds as spores bearing structures like sclerotia, acervulus, pycnidia or perithetia and mycelium outside or inside the seeds. Some pathogens are seed-borne but they cannot immediately transmit the disease to seedlings as they arise from seeds for example bunt of wheat. The pathogen comes into contact with seed when its ripening process is completed or almost completed. The pathogens penetrates only the surface layers. This results in shallow intection when stored in godown.

Besides seed infestation and seed infection there can be another kind of association of pathogens with seed material. It is called contaminant contamination. In this case the seed material is mixed with bits of infected crop tissues, for example infected bits containing Oospores of the pathogen mixed in bajara grains and infected stem and leaf bits of wheat having uredospores mixed in wheat grains at the time of packing the bags. Such contaminated pathogens seen in seed godown are Curvularia Boed, Nigrospora zimm., Epicoccum Link, Alternaria Nees, Helminthosporium Link, Aeciospores and Uredospores of Puccinia graminotritici, Tilletia, Smut (Ustilago) spores, Phoma Sacc Fusarium etc.

Seed associated micro-organisms have either long or short life. They associate upto the viability of seeds or more than that. The rice seeds are infected by fungus like Aspergillus, Curvularia, Fusarium, Tilletia, Phoma, Monascus, Drechslera, Sclerospora, Cercospora, Epicoccum, Melanomma, Hendersonia and Trematosphaerella etc. Suzuki (1930) established that Drechslera oryzae, carried in the seed, causes the initial development of the disease in spring.

Reyes (1933) has reported that rice bunt which is caused by Tilletia barclayana found to be seed transmitted in the Phillippines. Paul Neergaard (1960, 63, 66) reported that, there prominent seed borne diseases of rice, brown spot caused by Drechslera oryzae, blast caused by Pyricularia oryzae are the two

most important. To these may be added a third major disease, stackburn caused by Trichoconis padwickii and Helminthosporium. Brown spot was one of the major cause of the Bengal famine in 1942-43. It has been found to induce losses of upto 30% in weight of rice grains (Bedi and Gill 1960). Blast caused by Pyricularia in India is variable for upto two thirds of the yield (Kulkarni 1959).

The presence of mycelium of Drechslera oryzae in rice seed has recently been studied by Fazil and Schroeder(1966). By using standard histological technique they demonstrated profuse mycelia of the pathogen in endosperm. Also pericarp and seed coat are invaded as already shown by Niskikado and Nakayama (1943). Merny (1957) studied 23 varieties showing infection to glumes.

Suzuki (1934) found Pyricularia oryzae Cav. within the tissue of embryo, endosperm, bran layers, glumes and also between the glumes and the Kernel. Ganguly(1946) observed the Trichoconis Padwickii as Sclerotia in the endosperm of rice.

Some fungi are probably not seed transmitted but develop under favourable condition during maturation and harvesting of the crop. Which cause reduction in quality. It may be due to Kernel discolouration produced by weak parasites or more saprophytes such as Alternaria Nees species, Curvularia species, Monascus species (red discolouration) Phoma species. Discolouration, necrosis, Kernel rot and loss of viability are caused by parasites

like Fusarium species, Drechslera oryzae, Sclerospora oryzae, Trichoconis species etc. Glume lesion and discolouration may be caused by all or most of these fungi as well as Cercospora oryzae, Epicoccum species, Melanomma species, Hendrosia etc. Fazil and Schroeda (1966) observed that the discolouration in the shelled or brown rice are relatively superficial involving only the bran layer, however, discolouration diffuses into endosperm by means of deeper infection by parasites such as Drechslera oryzae.

The seed borne microflora parasites and saprophytes responsible for the reduction of quality. whether by discolouration or by more profound damage in rice for milling or sowing varies greatly from locality to locality and according to local conditions. It is correlated with weather conditions prevailing during the maturation and harvesting of individual seed lots as observed by Neergaard(1960).The seed-borne fungi observed in rice seed godown are Helminthosporium, Curvularia, Nigrospora,Epicoccum, Alternaria, Fusarium, Phoma, Diplodia, Drechslera, Tilletia, etc.These pathogens cause the disease to rice grains. During storage, some saprophytic fungi recorded in godown are Aspergillus, Penicillium Link ex.Fries, Mucor, Rhizopus etc. Out of these Aspergillus are in large amount which damage the seeds. The fungal infection of rice grains is mainly responsible for failure to germinate. Several fungi viz. Aspergillus, Curvularia, Fusarium were found to invade the outer seed coat, endosperm and embryo of rice seeds and some of them produce certain non-specific toxins which kill

the embryo resulting in failure to germinate.

Most of the pathogens do not affect the embryo of seeds during condition of storage, they only attack the developing embryo during germination. But some pathogens like Trichoconis, Padawickii, (now called Alternaria Padwickii), Fusarium moniliforme on paddy seeds are known to inactivate the embryos particularly when the seeds are heavily contaminated by them.

The seed godown at Shahu Market Yard, Kolhapur contains fungal spores which are known to cause the diseases to wheat, rice and Sorghum seeds and later to crops. The diseases caused by these pathogens to wheat, rice and Sorghum are as follows- Smut (Ustilago) causes loose Smut and cover Smut, Tilletia cause Hill bunt to wheat, Alternaria species cause Alternaria leaf Blight to wheat, Helminthosporium cause foot rot, leaf spot and leaf blight to wheat. Smut (Spacelotheca) cause grain Smut to Jowar, Helminthosporium cause leaf blight to Jowar, Fusarium species cause seed rot and seedling blight to Sorghum, Phoma cause black rot to Sorghum, Fusarium species cause foot rot to Rice. Helminthosporium species cause Brown spot to rice. Pyricularia cause Blast disease to rice. Tilletia species cause rice bunt to Rice. Brown spot of rice is caused by Drechslera, Kernel discolouration in rice is caused by Alternaria, Curvularia, Phoma species. Discolouration and loss of viability are caused by parasites such as Fusarium species, Drechslera species, Sclerospora in rice. Glume lesions and discolouration may be caused by Cercospora

species and Epicoccum species.

Fusarium, Penicillim, Rhizoctina and Helminthosporium destroy the endosperm (the starchy tissue of seed) of stored seeds. Fusarium monilliforme rotting the seeds. Penicillum oxalicum attacks the endosperm and thus arrest the germination.

In view of the substantial loss in quality and biological hazards involved in fungal infestation of grains in storage, it is prime important to take necessary precautionary majors to control storage fungi. Being a national wealth and a source strength for any nation, the protection of grains is a dire necessity. An awareness of the need for protecting the grains from fungal damage is there, but the task of storing them in an environment which keeps them viable but inactive the metabolic activity reduced to a minimum, is a formidable one and full of challenges.