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AN EVALUATION ON GRAIN QUALITY UNDER POST HARVEST STORAGE IN SELECTED INDIAN WHEAT VARIETIES

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ABSTRACT

Wheat belongs to the genus *Triticum* of the grass family, Poaceae. This genus is originated in tropical South west Asia, where it occurs in wild as well as in cultivated forms. Man has depended upon the wheat plant for thousands of years. Wheat (the *Triticum* spp.) is cultivated worldwide. The grain production varies from year to year and hence the grains should be stored strategically from years of overproduction for the use in year of under production. Also grain must be stored for several other reasons such as point of production is not the point of consumption and the time of production is not the time of consumption. Stored grains can have losses in both quantity and quality. Grain quality after harvest is influenced by a wide variety of biotic and abiotic factors and has been studied as a stored grain ecosystem. Losses occur when the grain is attacked by microorganism and other organisms including insects, mites, rodents and birds. The grain losses found in quantity and quality; can be in the form of depletion in seed viability, hardness, color, size and shape, grain weight and various biochemical parameters viz., protein, carbohydrate and vitamins under post harvest storages. The storage fungi damage the grains in several ways; they reduce the germinability, produce undesirable odor and kernel discoloration, decrease the food value and also produce toxins injurious to the health of consumers.

INTRODUCTION: Stored grain can have losses in both quantity and quality. The loss occurs during post harvest storage of wheat grains due to the biotic and abiotic factors. The post-harvest losses of wheat are estimated about 8 per cent of production. Several million colonies of storage fungi have been reported from a gram of dust collected from grain elevators and warehouses [1]. The post harvest loss of wheat grain has been found to be highest during storage. Grain quality after harvest is influenced by a wide variety of biotic and abiotic factors and has been studied as a stored grain ecosystem. Stored grains can have losses in both quantity and quality. Losses occur when the grain is attacked by microorganisms and other organisms including insects, mites, rodents and birds [2-11].

Experiments Conducted and Outcomes:

Experiment 1: Characterization of grain hardness of stored wheat grains (Hardness tester): Two Indian wheat grain varieties viz., U. P. 262 and H. D. 1982 were selected and samples were taken from five different sites of Allahabad at four different time periods starting from 12 months of storage (P1) to a maximum of 30 months with time interval of 6 months each (P2 to P4). The important parameter like hardness was carefully observed and determined during every six months for two years. It was observed that the deterioration of the stored wheat grain occurred with time duration which leads to the morphological change of stored wheat grains. The samples collected from the local farmer of Naini and Karchana has shown only negligible change in shape as compared to the other samples collected from the wholesale markets and Govt. godown, Naini.

Experiment 2: Determination of seed viability of stored wheat grains by sprouting test: The germination studies show that viability of the stored wheat grain reduces on storage. The study has shown that the U.P. 262 has much more sprouting capability as compared to H.D. 1982. The sprouting capacity of both the varieties analyzed showed a decrease to about 70% after three years of storage. After 3 years it takes from days to weeks and in some cases even months for sprouting to be complete.

Experiment 3: Evaluation of the fungal infestation of stored wheat grains (Dilution plate technique): All the experiments on the infestation of epidermal and sub-epidermal region were done very carefully and systematically. The mycoflora of stored wheat grains predominantly consisted of ubiquitous mould genera *Aspergillus, Alternaria, Cladosporium, Fusarium, Mucor, Rhizopus* and *Penicillium* possibly because of their omnipresence, capacity to grow on all possible substrates and a wide range of temperature and humidity. The most frequent species observed in the stored wheat grains of *Aspergillus* were *A. niger, A. fumigatus, Alternaria alternata, Fusarium moniliformis, Rhizopus arrhizus* and a few *Pencillium* species. Among these the frequency of *A. niger* was highest which has the capacity to produce mycotoxin which can contaminate and cause spoilage.

Experiment 4: Quantification of wheat grain spoilage on the basis of biochemical parameters (HPLC test): The biochemical study of stored wheat grain was done and it was observed that deterioration of protein and carbohydrates takes place. The deterioration or loss of protein and carbohydrate content is very much apparent in every six months. It was observed that during the study, about 3-4% loss of protein and carbohydrate was prevalent, this can be due to genotypic nature and biotic and abiotic factors also. The percentage of protein loss leads to future infection and infestation by other organisms.

DISCUSSION: There are several reports related to hardness is a whole grain characteristic defined as the grain resistance to applied deformation is largely determined by the endosperm properties considering its proportion in grain and its hardness reduces with the time duration [12-16].

The result obtained in the investigation showed that the stored grain loses its viability with time. This can possibly be due to the mycotoxins produced by fungi. Similar results of post harvested wheat grains having reduced sprouting under storage has been obtained by other scientists [17-23].

Reports from various countries show that this species is found to be the most common post harvest fungi. The presence of fungi in stored wheat grains in Italy has been reported by many scientists [24-26]. The investigation done on biochemical losses as continuous deterioration has previously shown in many reports in the post harvest stored wheat grains [27, 28].

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