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A study on *Glycine max (l.) Merril* (Soybean)

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Abstract - The soybean (Glycine max (L.) Merril) is a commercially significant leguminous seed crop for feed and food applications, containing 40% seed protein and 20% oil. Among the major oil crops, soybean ranks first in world production in international trade markets, followed by cottonseed, groundnut (peanut), sunflower seed, rapeseed, linseed, sesame seed, and safflower. Many oilseed crops' seeds are known to have substantial mycoflora. The current study's aim was to determine fungus linked with distinct varieties of soybean, as well as isolate and identify them. The presence of mycoflora in seeds was determined using several cultivars. For amino acids, lipids, and enzymes, qualitative estimate was a critical step. The effect of plant extracts on cereal seed mycroflora, seed germination, seedling emergence, root and shoot lengths was investigated.The results show that Alternaria tenuis, Aspergillus defects, Rhizopusstolonifer, and Curwlarialumtaare key fungus for altering nutritional value, and their proliferation causes substantial quality of the seeds.As a consequence, it may be concluded that these fungi have well-equipped enzyme systems to degrade and use any form of storage molecule found in oil seeds. However, the degree of enzyme production differed across the mycoflora, which might be attributed to variances in adaptation among different fungi.

Keywords - Glycine max (L.) Merril, Soybean, Oilseed, Mycoflora, Cultivars

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INTRODUCTION

Soybean *(Glycine max (L.) Merril)* is an Asiatic leguminous plant used around the world for its oil and protein, which are widely employed in the production of animal and human diets. Soybean is the most important crop grown in Brazil in terms of planted area and production, and it is extremely important for the state of Paraná, which is one of the key Brazilian soybean-growing areas producing soybeans for export. Soybean monoculture may occasionally cause environmental difficulties and also promotes the exponential rise of pest populations, resulting in crop losses of roughly 30%, due to soybean's susceptibility to insect attack during its whole life cycle (Pimentel et.al., 2006).

India is one of the world's top producers of oilseeds. Nearly 84 percent of the 20 million hectares dedicated to oilseed cultivation are rainfed. Nine cultivated oilseed crops, including groundnut, rapeseed/mustard, sesame, safflower, soybean, and sunflower, are used to make vegetable oil. Linseed and castor seed are used for non-edible purposes.90% to 95% of the area used for oilseeds is still rainfed, with around 80% of that area being dry plains with no irrigation systems at all. It has been shown that kharif oilseed crops frequently experience a considerable loss in yields and oil content at crucial development stages before maturity when rains are absent (Zainum et al., 1979)

It is discovered that the seed mycoflora naturally linked with the grains is what causes seed degradation and also poisons the grains. Similar to this, many seed-borne fungus are known to hinder seed germination and seedling emergence as well as cause major crop diseases such seed rot, seedling rot, and seedling blights, among others. All oilseed crops have losses in terms of seed quality and quantity due to seed-borne fungus. Additionally, these fungi hinder seed germination and storage ability. They are in charge of diseases including seed rot, seedling blight, root/stem rot, foliar infection, and pod blight (Lambat et.al., 1969; Agrawal et.al., 1972; Agrawal 1974).

It is well known that the seeds of many oil seed crops contain significant mycoflora. Microorganisms that are carried by seeds have a significant impact on agricultural productivity in the field and shorten the shelf life of seeds. Numerous instances show that such mycoflora has a negative impact on seed germination, vigour, and the quality and amount of oil (Ward and Diener, 1961; Kadian and Suryanarayana, 1971). Several mycoflora commonly cause seed degeneration, which causes loss of viability, and numerous fungus to grow on stored seed (Lalithakumari, 1970).

Oilseeds are vulnerable to fungal assault because of the unclean storage conditions. Both qualitatively and quantitatively, the grains are deteriorated by the

fungus. Changes in the amounts of lipids, proteins, and carbohydrates are caused by storage fungus. As a result, the use of the nutrients contained in seed by fungi and conversion into CO2 and water reflect variations in seed quality and gross weight (Prasad et.al., 1990).

Major oil seed crops in Marathwada include soybean, groundnut, sunflower, safflower, and sesame. The primary supply of vegetable oil comes from these oil seeds. Since soybean contains 40% protein and is a great source of edible oil, it is grown as both an oil seed and a pulse crop. In the recent years, it has been noted during our assessment that the crop has had a variety of illnesses, mostly brought on by fungus. These affected plants produce aberrant and subpar seeds. So, a research of the soybean seed mycoflora was conducted. The research was mostly broken down into two components. First, attempts were undertaken to separate, identify, and determine the type of seed mycoflora from standing crop (Brook and White, 1966).

Numerous researchers have looked closely at the quantitative and qualitative aspects of the oilseed seed mycoflora. The screening, isolation, and identification of the seed-bome fungus connected to the chosen oil seeds are the subject of a section of the thesis. The three common farmer-grown cultivars of safflower, soybean, and Nigeria had the seed-bome fungal. From the nine distinct types of the three different oilseeds, more than twenty fungi were isolated. *Altemaria tenuis, A. altemata, Aspergillus niger, A. flavus, A. fumigatus, Curmlarialunata, Rhizopusnigricans, R. stolonifer, Fusariumoxysporum, and F. moniliforme* were the most prevalent and dominating fungus. These mushrooms were brought in as pure cultures and kept in a lab for additional research (Wan Zainun and Parbery, 1977).

It is generally known that mycoflora causes grains to deteriorate during storage, and one of the elements affecting grains during storage is the storage structure. This topic was the subject of systematic research. Study was done on the occurrence germination percentage data. The rate of germination gradually decreased (Prasad et.al., 1990).

Less research has been done on the role of seed-home fungus in seed degradation and alterations caused by these seed carried fungi in storage in our region. The main issues with oilseeds in storage are seed content changes, rancidity, storage temperature and moisture, among others. With these limitations in mind, substantial research was done on the mycoflora that is present in seeds, storage temperature and moisture, seed bio-deterioration caused by the depletion of fatty acids and lipids, proteins, and amino acids, as well as the release of lipases and proteases. The link between these fungi and the biochemical changes they cause have been well researched and are given (Kanmanithi, 1996).

Hot water treatment of soybean seeds resulted in the lowest percentage of seed germination. Seed lost viability as a result of softening and degradation. Onions, tomatoes, crucifers, and celery are just a few of the vegetables and cereal seeds that might benefit from hot water treatments, according to Neergaard (1977). According to this study, benomyl is one of the fungicides that is most effective against the potentially harmful fungus that might grow on soybean seeds. However, because only in vitro trials are used in this research on seed treatments, no practical conclusions can be made. Regarding seed germination, a similar word of warning is used (Castor and Frederiksen, 1981).

In the current study, by using the conventional blotter and agar plate procedures, the seed borne fungus of soybean were isolated from the seeds of various types, aberrant seeds, and stored seeds. investigations on the generation of lipase and protease outside of cells are also included. Studies on the seed mycoflora, seed germination, and seedling emergence of soybean seeds treated with extracts were conducted. The majority of the plant extracts were discovered to be antifungal and to enhance seed germination, seedling development, and vigour (Das, 1977).

OBJECTIVES OF STUDY

- To determine fungi associated with various varieties of soybean popular among the farmers.
- To isolate and identify fungi associated with various, varieties of soybean seeds.
- To study the biochemical changes induced by the seed associated fungi responsible for deterioration of seeds.
- To screen commonly found plant in the region for management of the seed borne fungi.

MATERIALS AND METHODS

- Soybean cultivars were acquired from the Marathwada Agricultural University's Oilseed Research Station, local farmers, warehouses, local traders, etc. Mycoflora in seeds was examined in the following cultivars. Glycine max Linn:Ankur, Durga, Gaurav, JS 335, MAUS2, MAUS81, MAUS71, Prasad, Parbhanisona and Pooja.
- Using the agar plate and blotter test procedures advised by the International Seed Testing Association (1966), de Tempe (1970), Neergaard (1973), and Agarwal, the oilseed-borne fungus were identified
- Pure cultures of each individual fungus were produced after separation from dilution plates. Each fungus was then cultured independently on PDA/GNA medium, and its growth and sporulation were noted. Their identifications were verified by the

Department of Plant Pathology at the IARI in New Delhi.

- The impact of storage duration on seed mycoflora was studied using the seed kept in gunny bags at 272°C.
- Qualitative Estimation was performed for amino acids, lipids and enzymes.
- Effect of plant extracts on seed mycroflora on cereals, seed germination, seedling emergence, root and shoot lengths were examined.

RESULTS

- It was discovered that increasing surface mycoflora reduced the development of several noteworthy fungi on agar plates.
- Some surface fungus may have become hazardous to true pathogens due to their rapid and aggressive development (species of *Rhizopus, Aspergillus*, and so on) and the synthesis of antibiotic compounds (*Chaetomiumglobosum, Trichodermaviride and Penicilliumsp*).
- Nine soybean cultivars were isolated for fungal flora associated with the seeds utilising a normal blotter, agar plate, and seed washing approach. *Aspergillus flams, Aspergillus niger, Aspergillus fumigatus, Rhizopusstolonifer, Alternaria tenuis, Penicillium sp., Chaetomium sp., Cladosporiumherbarum, and Curvularialunata* were among the fungal flora isolated.
- Endophytic fungi are those that can be separated from surface sterilised seeds, whereas ectophytic fungi are those that can be isolated from unsterilized seeds by direct plating.
- It is now well recognised that storage fungus have negative effects in a variety of ways, including reduced seed germination, discoloration, and biochemical changes in the seeds. Many researchers discovered that stored seeds develop moulds such as *Aspergillus, Fusarium, Penicillium, Altemaria, Curvularia*, and others that affect germination and variability of seeds, discoloration of seeds, reduction of oil content and loss of quality, development of mycotoxin problem, loss in grain weight, and unfit for sowing and human consumption.
- The results show that *Alternaria tenuis, Aspergillus defects, Rhizopusstolonifer, and Curwlarialumta*are key fungus for altering nutritional value, and their proliferation causes substantial quality of the seeds.

CONCLUSION

The study's findings suggest that the soybean *(Glycine max (L.) Merril*), which contains 20% oil and 40% seed protein, is a commercially relevant leguminous seed crop for feed and food purposes. The purpose of the current study was to detect, isolate, and determine the fungi associated with several soybean cultivars. Several cultivars were used to assess the mycoflora content of seeds. A crucial step was the qualitative estimate for amino acids, lipids, and enzymes. Investigated were the effects of plant extracts on the mycroflora of cereal seeds, seed germination, seedling emergence, and root and shoot lengths. The findings demonstrate that the primary fungi responsible for changing nutritional value are Alternaria tenuis, Aspergillus flaws, Rhizopusstolonifer, and Curwlarialumta. Their widespread proliferation has a significant negative impact on the quality of the seeds.We may thus infer that these fungi have well-equipped enzyme systems to break down and use any type of storage molecule present in oil seeds. The level of enzyme synthesis, however, varied across the mycoflora, which might be explained by variations in adaptability among various fungi.

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