Isolation of Mycoflora from Grains of Triticum Vulgare Linn. Treated with Potential Fungicides by Paper Towel Method

Deepak Gupta
Department of Botany
Thakur College of Science & Commerce, Kandivali (East), Mumbai 400101, India

Udaybhan Yadav
Department of Botany
Thakur College of Science & Commerce, Kandivali (East), Mumbai 400101, India

Shruti Papaiya
Department of Botany
Thakur College of Science & Commerce, Kandivali (East), Mumbai 400101, India

Vinit Vaidya
Department of Botany
Thakur College of Science & Commerce, Kandivali (East), Mumbai 400101, India

Abstract

Plant pathology is a branch of Botany, which deals with study of various types of diseases, their symptoms, effects and remedial measures. When any microorganism invades the plant, it causes serious damage to it in terms of morphology, anatomy, biochemistry and physiology. Environmental conditions also play an important role in these cases. Seed is a basic unit of life that is miniature form of the plant and helps the plant to sustain the next generation. A healthy seed is a key factor for assured healthy growth and vigour. Hence, maintenance of the quality of the seed is of vital importance in the field of plant sciences. Seed invasion by fungal pathogens is of common occurrence in case of agriculture because of which the entire crop can be spoiled. Some of the fungal pathogens can be revealed very easily due to morphological characters but some may not be. In that case, we need to use various methods apart from the conventional methods. Hence, various methods to isolate the fungal pathogens have to be implemented to detect all the possible organisms present as seed borne pathogens. In the present studies, the authors have implemented Paper Towel Method to isolate the fungal organisms from the grains of wheat and also to study the impact of various fungicides on their growth.

Keywords: Grains, Seed Borne Fungi, Paper Towel Method

I. INTRODUCTION

The term “Seed Pathology” deals with seed health and seed borne microorganisms along with physical conditions, deficiency of elements, aging, preventing and controlling the seed borne diseases in the field and during storage. Pathologists have found existence of seed borne fungi, and found out the control measures for the diseases by developing various methods. One of the most effective amongst them was seed dressing with the chemicals. Some phytopathologists suggested seed dressing by using copper sulphate against smut or bunt of wheat. Use of organic mercurial compounds to treat smut of wheat was also suggested by some of them. Von Schemeling and Kulka (1966) reported use of carboxin to treat seed borne loose smut of barley caused by Ustilago nuda.

Seed is a pioneering unit in the life cycle of any plant. The quality and quantity of the seeds can decide the fate of the future crop. In Vrukshyayurved (800 A.D.) there are references of seed treatment with milk, honey, cow dung, cow urine and even ashes. Our ancestors could find out various methods of disease control by their experiences. The seeds treated with milk, rubbed well in cow dung and after drying again rubbed in honey and powder of Embelia ribes (Vavding) were found to grow without fail. “Manusmruti” also emphasized upon good quality of seeds to keep the next generation healthy. Helweg (1699) proved that some disease agents are carried within the seeds of rye plant, which was Claviceps purpurea. Tillet (1755) proved it for the first time that bunt of wheat is contagious and carried through the seeds. Frank (1833) worked upon seed borne nature of Colletotrichum lindemuthianum causing anthracnose of bean.

International Seed Testing Association (ISTA) published the International rules for seed testing in 1966. Research papers published from the institute on the identification of some of the common genera of the fungi such as Curvularia (Benoit and Mathur, 1970), Fusarium (Ram Nath, Neergaard and Mathur, 1970), Drechslera (Chidambaram, Mathur and Neergaard, 1973) and Colletotrichum (Kulshreshtha, Mathur and Neergaard, 1977) are very useful references. In 1977, Neergaard published his book “Seed Pathology” in two volumes, which proved to be a landmark in the field of seed pathology. Hence, identification of the fungi is an essential step while dealing with seed pathology. The diagnostic characteristics of the fungi in terms of colony growth and sporulation are very important. For many fungi, seeds provide an excellent natural substrate for growth and development to exhibit the diagnostic characters which can be used for their identification. The extent of occurrence of seed borne fungi depends upon...
Isolation of Mycoflora from Grains of Triticum Vulgare Linn. Treated with Potential Fungicides by Paper Towel Method

(Mehrotra, 1967). Hence, study of effect of temperature on the seed borne fungi is also essential to confirm nature of the pathogens.

II. MATERIALS AND METHODS

To test effectiveness of the fungicides against the fungal pathogens, three different potential fungicides like Neem Extract, Bordeaux Mixture and Magnetized water were used in vivo.

A. Paper Towel Method

In this case, the seeds were treated with respective fungicides at the rate of 2.5 gm of fungicide per one kilogram of seeds, 24 hours prior to testing. 25 grains were arranged in 5 rows and 5 columns in-between two moist paper towels. The towels were covered with a butter paper and were rolled together without displacing the seeds. The rolls were incubated at 28(± 2)°C for 14 days. The germination count was taken in terms of normal seedlings, abnormal seedlings, Seed rots and non-germinated grains (Sahu & Agarwal, 2003). The associated fungi were detected.

Table - 1

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of the Fungal Organism</th>
<th>Normal Water</th>
<th>Neem Extract</th>
<th>Magnetized Water</th>
<th>Bordeaux Mixture</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Alternaria alternata</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Alternaria brassicicola</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Ascochyta graminicola</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Aspergillus ustus</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Chaetomium spp.</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Curvularia geniculatus</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Curvularia lunata</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Drechslera spp.</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Fusarium chlamydosporium</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Fusarium poae</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Helminthosporium spp.</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Rhizopus stolonifer</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

III. OBSERVATIONS AND RESULTS

Above mentioned tabulated results clearly indicate that the wheat grain samples collected from the provisional stores were infected with the fungal organisms. These fungal organisms were isolated and identified. It was also seen that depending upon the type of fungicides, growth of the fungal organisms can be restricted. There were 12 fungal organisms isolated from the samples treated with normal water (taken as control) but when they were treated with fungicides such as Neem Extract, Magnetized Water and Bordeaux Mixture; there was a considerable decrease in the number of fungal organisms.
The wheat grains collected from various places such as provisional stores or any kind of shops may appear healthy by looking at their external morphology but may be infected internally due to invasion of various fungal organisms. This infection is not seen from outside but may deteriorate the biochemical elements from the grains leading to the nutritional loss. In many cases they also produce secondary metabolite in the form of mycotoxins, which cannot be only harmful to the human beings but prove to be fatal in many cases.

When the grains are coated with the fungicides such as Neem Extract, Magnetized Water and Bordeaux mixture; they act against these fungal organisms to prevent their growth and help us to protect the grains.

ACKNOWLEDGEMENT

Authors are indeed grateful to the Management and Dr. (Mrs.) C. T. Chakraborty, Principal of the College to provide infrastructural facilities and also the moral support throughout the tenure of the project. We are also very much thankful to Dr. C. P. Shukla, the Head; Mr. Bholanath Yadav, Laboratory Assistant and Mr. Pravin Singh (Sonu), the Peon from the Department of Botany for their support and cooperation.

REFERENCES