


# Rust Disease and its Damage in Grain Fields

Rasulova Madina Shukhratovna

Senior Researcher

"Research Institute of Plant Quarantine and Protection"

	<p><b>Abstract</b></p> <p>This article provides information on the development of rust disease in grain fields, one of the main diseases of grain plants, which develops in all parts of the plant, the accumulation of harmful fungi in these diseased leaves, stems and other plant organs, the disruption of the photosynthesis process of grain crops with rust disease, leading to a decrease in yield by up to 30-40%. Also, various measures are used to combat rust disease in grain fields, such as fungicides, biopreparations and planting disease-resistant grain varieties. Agronomic methods, such as regular inspection of plants, periodic treatment of crops and the use of clean seeds, are important in controlling the disease. Rust disease not only damages grain, but also negatively affects the quality of agricultural products. Therefore, it is necessary to develop effective methods of combating this disease and put them into practice.</p>
<p><b>Keywords:</b> Rust disease, Puccinia spp, Cereal plants, Damage symptoms, Photosynthesis disruption, Growth arrest, Yield reduction, Fungicides, Resistant varieties, Disease spread, Agricultural losses.</p>	

## Introduction

The Resolution of the President of the Republic of Uzbekistan Sh. Mirziyoyev No.PQ-3696 of July 5, 2018 provides for the elimination of existing problems in the agricultural sector, the use of modern technologies and increasing the effectiveness of agronomic measures in combating diseases. New technologies and treatment methods are introduced to prevent the spread of diseases such as rust. The Resolution of the President of the Republic of Uzbekistan No. PQ-3541 of May 23, 2018 is aimed at improving the system for combating plant diseases and pests. It provides for the creation of necessary conditions for research and the introduction of new technologies in combating diseases such as rust. The Resolution of the President of the Republic of Uzbekistan No. PQ-3087 of December 23, 2017 provides for the development of new measures to protect plants and combat their diseases, including rust, and the effective use of fungicides and other protective agents.

These decisions of Sh. Mirziyoyev include measures to protect grain production and other agricultural products from diseases and improve their quality. These decisions aim to introduce modern and innovative methods to combat plant diseases and pests, including rust.

In grain fields, rust disease (*Puccinia* spp.) is one of the most dangerous and widespread diseases of grain plants. This disease occurs in grain crops, in particular, in plants such as wheat, oats and barley. Rust disease develops on the leaves, stems and flowers of plants, stops the growth process, reduces the quantity and quality of the crop. The disease can disrupt the photosynthesis process, weaken the plant and lead to the loss of high yields. Therefore, it is important to use agrotechnical, chemical and biological methods to effectively combat rust disease and reduce its damage. The rust pathogen belongs to the genus *Puccinia* and is formed on the leaves, stems, etc. of grain.

## **Rust disease and its damage:**

### **1. Damage symptoms:**

- Leaves: Rust disease forms dark rectangular spots on the leaves of cereals. These spots are initially yellow or red, and then their color darkens and develops into black rust.
- Stems and others: Rust disease can also damage stems and flowers. In this case, the plants slow down in development and the nutritional process is disrupted. Damage:
- Growth arrest: Rust disease disrupts the photosynthesis process of the plant through the leaves, resulting in growth arrest and slow plant development.
- High yield reduction: Rust disease slows down growth processes and causes a quantitative and qualitative decrease in the yield. This especially reduces grain yield and has harmful consequences in agriculture.
- Weakening: When grain plants are infected with rust, their immunity decreases and their resistance to other diseases also decreases.

### **2. Control measures:**

- Selection of resistant varieties: Planting grain varieties that are resistant to rust disease.
- Use of fungicides: Use of specific fungicides to eliminate rust disease pathogens.
- Conducting heading and pruning: Use of agrotechnical measures to control the disease, such as cleaning the fields and continuous plant care. Thus, rust disease in grain fields can cause serious damage to agriculture, but damage can be reduced through modern agricultural practices and effective control methods.

## **Materials and Methods**

Materials and methods on the topic of rust disease and its damage in grain fields

### **1. Materials on rust disease in grain fields:**

- Collection of plant samples. Collection of samples of grain plants showing signs of rust disease in grain fields. These samples are selected from plants such as wheat, oats, barley.
- Rust pathogens. Fungi of the *Puccinia* genus that cause the disease are identified on the leaves, stems and other parts of plants.
- Biological and chemical preparations. Fungicides (for example, "Topsin-M", "Anvil", "Folicur") and biological control agents (for example, *Trichoderma harzianum* and other biopreparations) are used against rust disease.
- Grain varieties. Grain varieties with different properties against rust disease, including disease-resistant varieties and common varieties.

## 2. Methods for determining the cause of rust disease in grain fields:

### 2.1. Determining the degree of damage:

- Samples are taken from grain fields and a visual analysis is performed to check the presence of rust disease symptoms on the plants, that is, red, yellow or black spots on the leaves.
- Leaves and stems of plants with rust disease symptoms are examined microscopically to identify the Puccinia fungi that cause the disease.
- The degree of damage is determined in %, that is, how many leaves are affected by rust disease.

### 2.2. Studying the spread of rust disease:

- The speed and intensity of the spread of the disease are monitored in each plant area for a certain period.
  - To study the spread of rust disease in each area and how climatic conditions (humidity, temperature) affect its growth, plants are monitored at certain intervals.
- ### 2.3. Fighting with fungicides:
- Test fields are allocated to study the effectiveness of various fungicides and biopreparations. The use of each fungicide and biopreparation and its effect during the growth period are monitored.
  - Fungicides are applied to plants in different doses and their effectiveness in combating the spread of rust disease is evaluated.

### 2.4. Testing the resistance of varieties to the disease:

- Studying the resistance of different grain varieties to the spread of rust disease according to their characteristics. To assess resistance, disease-resistant and common varieties are compared.
- These varieties are planted in the fields and their resistance to rust disease is studied.

## 3. Results and Analysis:

- Based on the research results, a conclusion is drawn about the damage caused by rust to grain plants and the effectiveness of control methods.
- Which fungicides and biopreparations are most effective and ways to increase the resistance of plants to rust are suggested. Using these methods and materials, a comprehensive analysis of the damage caused by rust in grain fields and methods of controlling it can be conducted.

## Results and Discussion

Scientific works on rust disease and its damage in grain fields, scientific studies conducted by various specialists and the results obtained on their basis are of great importance in the field of grain growing

Scientific results of T.Kh. Karimov, R.S. Ibragimov on the topic "Rust disease in grain plants and its biological properties". The study studied the biological properties of the Puccinia genus, which causes rust disease. The study studied how quickly rust disease spreads in grain plants, its effect on different varieties, and how the disease affects the growth process. The scientific work highlighted the development of rust disease in grain crops and its negative impact on the yield. The fact that rust disease can lead to a 30-40% reduction in yield in wheat and other grain varieties, as well as the effectiveness of various fungicides, was analyzed.

A.S. Rahmonov, D.T. O'tkirov. The scientific results entitled "Rust disease in grain fields and methods of combating it" studied the effectiveness of fungicides used to combat rust disease. As a result of experiments with fungicides, including "Topsin-M", "Folicur", "Anvil", it was found that the drug "Topsin-M" is the most effective. The effectiveness of combating fungicides, their widespread use in agriculture and the need for new generation fungicides were discussed. The study emphasized the need for correct and timely treatment of crops.

M.S. Ismoilov, D.M. Ganiyev, in their scientific results and research entitled "Selection of grain varieties against rust and their resistance", attention is drawn to the work carried out on the creation of new grain varieties resistant to rust. Field tests were conducted to study the resistance of varieties to rust and other diseases. As a result, new varieties showed significant resistance to rust. The importance of developing rust-resistant varieties and the possibility of increasing crop yields with these varieties was emphasized. The adaptation of grain varieties to environmental conditions and biological properties were also discussed.

A.A. Khojaev, in his scientific results and research entitled "Distribution of rust and its impact on grain yield", the dynamics of the spread of rust was studied. It was determined that rust spreads rapidly in humid and warm conditions, and its negative impact on the yield can be up to 25-40%. The fact that the spread of rust is associated with climatic factors, and that humidity and temperature increase the disease during growth were discussed in detail. Preventive measures against this disease and methods of plant protection were also proposed.

F.S. Dovudov "Rust disease and environmental risk in grain fields" scientific results: It was determined that rust disease in grain fields causes environmental damage to crops, including reducing the efficiency of agricultural land. Based on the study of the high level of environmental risk of the disease and its impact on agricultural potential, preventive and treatment methods were proposed. The level of environmental risk of the disease and its negative consequences in agriculture, as well as modern methods and strategies for combating this disease were discussed.

## Conclusion

The above scientific works are aimed at studying the use of various methods in theory to combat rust disease and its damage in grain fields, the development of new varieties, the use of fungicides and biological control agents. Rust disease can cause serious damage to grain crops, therefore, it is important to develop effective methods of combating this disease and put them into practice. Rust disease in grain fields is one of the most dangerous and widespread diseases of grain plants. This disease develops on the leaves, stems and other parts of grain, disrupts the photosynthesis process and leads to a cessation of growth. As a result, a significant decrease in the quantity and quality of the crop occurs. Rust disease spreads rapidly depending on climatic conditions, in particular, high humidity and temperature, which increases its damage. Effective methods such as fungicides, biopreparations and planting disease-resistant varieties are used to combat the disease. It is necessary to increase the resistance of grain plants to rust disease, develop effective strategies to combat it, and focus on agronomic measures. Thus, an integrated approach is required to reduce the spread and damage of rust disease.

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