

HOW DO PLANTS DEFEND THEMSELVES AGAINST PATHOGENS?

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INTRODUCTION

Plants have resistance mechanisms to defend themselves against pathogens. However, not all of them are equally durable. Some are better to cope with the pathogen pressure that overcome the resistance response and hence are more durable in the field.

Powdery mildew is the most widespread leaf disease of cereals in the world. Cereals affected by powdery mildew produce few tillers and grains per spike, and the grains may be empty. This causes significant losses to farmers.

The fight against these diseases should not be based exclusively on the use of agrochemicals that threaten the environment and the consumer. Resistant plants can be identified by following the appearance of symptoms after inoculation. By means of microscopic techniques the type of mechanism that makes resistance possible can be determined. This is very important because this allows the resistance to last longer. Thus, the use of varieties naturally resistant to this fungus is of special importance in agriculture, since it achieves greater yield, quality and sustainability.

RESEARCH OBJECTIVES

In this Project one of the fundamental objectives is to characterize the resistance of 3 varieties of barley to a phytopathogenic fungus, powdery mildew (*Blumeria graminis f. sp. hordei*), both macroscopically and microscopically, in order to determine the defensive mechanisms that operate in each of them. Another one is to select the ones that would be better from the point of view of its durability.

EXPERIMENTAL DEVELOPMENT



Image 1: Planting plants

1. Sowing of plants.
2. Collection of the inoculum.
3. Inoculation.
4. Spore count and determination of their viability.
5. Plant incubation.

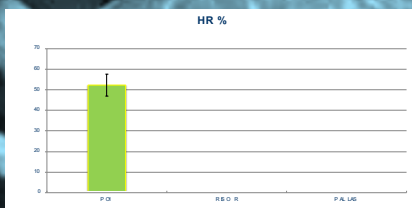
6. Evaluation of macroscopic symptoms of the disease.
7. Fixation and clarification of plants.
8. Preparation of samples for the microscope.
9. Staining and mounting of samples.
10. Microscopic evaluation of samples.
11. Data analysis.



Image 2: Inoculation ring

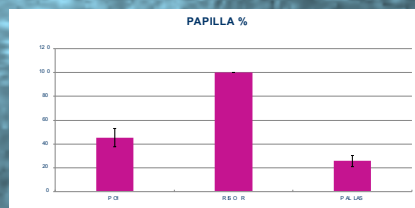
RESULTS

PRESENCE OF HR



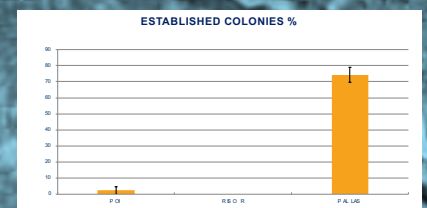
WE OBSERVED THE PERCENTAGE OF HR IN EACH GENOTYPE

PAPILLA FORMATION



WE OBSERVED THE PERCENTAGE OF PAPILLAE THAT HAVE BEEN FORMED IN EACH GENOTYPE

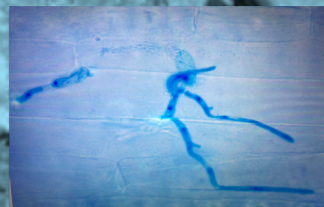
COLONIES WITH HYPHAE



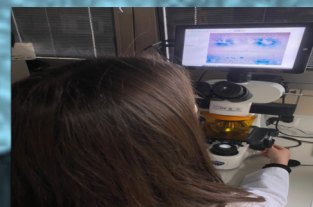
WE OBSERVED THE PERCENTAGE OF COLONIES WELL ESTABLISHED IN EACH GENOTYPE



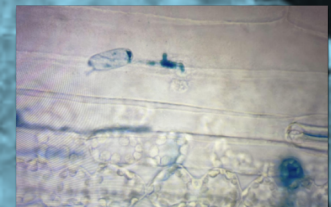
LEAVES ARE STAINED TO FACILITATE THEIR VISUALIZATION UNDER THE MICROSCOPE



EXAMPLE OF A MICROGRAPH SHOWING A CONIDIA THAT FAILED TO INFECT DUE TO A PLANT PAPILLA DEPOSITIONS AND ANOTHER THAT FORM A COLONY



LOOKING AT THE STAINED LEAF THROUGH THE MICROSCOPE



EXAMPLE OF A MICROGRAPH SHOWING A CONIDIA THAT TRY TWICE TO INFECT THE LEAF (TWO LOBES IN THE APPRESSORIAL GERM TUBE)

CONCLUSION

The data show that the Riso R and P01 genotypes are the most resistant because the pathogen form in them a lower percentage of colonies with hyphae, Riso R presenting resistance to cell penetration and P01 hypersensitive resistance.

In contrast, Pallas genotype is the most susceptible to powdery mildew infection showing a high percentage of well established colonies.

ACKNOWLEDGMENTS

To CSIC/IAS
To the researchers Elena Prats and Gracia Montilla
To our teachers: Elena León and Alberto Segovia
To the Fidiencia project and the Erasmus + project
To the Ministry of Education.
To IES Fidiána