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Research Article

NEW GENE DETECTING TECHNIQUE IN WHEAT

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ABSTRACT

Agriculture places a vital role in our day-today life.Due to many factors, agriculture has being diploiting. One such major factor is "pathogens", which infects the yield and affects the cultivation widely. Bacteria, fungi and virus are most commonly infecting pathogens in plant. One such crises in wheat cultivation is wheat has been infected and affected by various diseases like "leaf rust, stem rust and yellow rust". Due to these disease, wheat cultivation has been widely affected. Since, wheat is an important grain, which is also used as an alternative source of rice, this problem should be rectified in order to increase the wheat cultivation. Thus, researchers focused on increasing the stem rust disease resistance in wheat plant by cloning many disease resistance genes in wheat.But annotating the disease resistance gene from an whole wheat genome has become challenging job for the researchers.

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INTRODUCTION

Plants, has a defence mechanism against pathogens by nature. The defence is provided by a specific gene called *disease resistance gene or R gene*. These R genes produce *R protein* which fights against pathogens. In spite of these defence, plants are being infected by the pathogens since single resistance gene is not sufficient for the plant to resist the pathogenic effects. Hexaploid wild type wheat plant is also infected by a common disease called *stem rust* and *yellow rust*. Due to this disease wheat cultivation is affected. Dr.Wulff from **John Innes Centre** worked in finding new technique in order to annotate the disease resistance gene in wild type wheat plant. Dr. Wulff says that "if the wheat plant has more disease resistance gene(R gene), they will be capable to resist the pathogenic effects more effectively. Since, low level of resistance is not sufficient to resist the pathogenic effect, wheat plant should be cloned with *multi level production* i.e. more resistance genes should be cloned". But in the whole genome of plant it is very hard to annotate the disease resistance gene. Thus, Dr. Wulff's new technique *'MutRenSeq'* pinpoints the R gene from the whole plant genome.

Dr. Wulff states that, "MutRenSeq is a three step process in which the wild type wheat is first mutated by chemical mutagen *EMS (Ethyl Methyl Sulfonate).* Secondly, the chemically mutated wild type wheat is subjected to pathogens. The hypothesis in subjecting the plant to pathogen is, the plants which are not infected even when subjected to pathogens shows that the mutant does not mutate the R gene, thus it showed resistance against the pathogens. Wherein, the plants which are infected by the pathogens shows that, the mutant have been mutated the disease resistance gene(R gene). Hence, it failed to resist the pathogen. Third step involves *sequencing* and comparing both the wild type and infected plants (both are subjected to chemical mutation and pathogen) and looked for overlaps. Chemically mutated crops are sequenced by **illumina second generation sequencing** through which EMS effects can be identified and overlapped. Thus, R gene is pinpointed from the whole wheat plant genome and cloned in wild type wheat plant which provides multi level resistance. Through this gene detecting technology MutRenSeq Dr. Wulff and his team has successfully detected and cloned two stem rust resistance genes *Sr22 and Sr45* in wild type wheat plant. Dr. Wulff says that this new gene detecting technology reduces the use of agrochemicals and increases the wild type wheat yield and also he stated that MutRenSeq reduced 5-10 years of cloning period to 2 years.

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