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Determining the function of SNC1 in Arabidopsis plants

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When Arabidopsis must defend itself from bacterial infections, the process can potentially be harmful to the host plant. The specific gene I am focusing on in my project is SRFR1 (suppressor of rps4-RLD), which is involved in the avrRps4 triggered disease resistance pathway. SRFR1 is located close to the bottom of Arabidopsis' fourth chromosome. It was found that if a T-DNA insertion was made into exon 3 of SRFR1 in the Arabidopsis accession Columbia-0 (Col-0), one fourth of the plants are stunted, indicating that stunting is a recessive trait. Stunting in plants is a phenotype that is related to plants that have their defense mechanisms activated nonstop. However, mutations in SRFR1 in the Arabidopsis accession RLD did not cause stunting, indicating that genetic differences exist between Col-0 and RLD that control the stunted phenotype. In order for my project to begin, srfr1-3 plants (T-DNA insertion in SRFR1, Col-0 background) were crossed to RLD, and it was determined that stunting was based on two recessive genes. One candidate gene to contribute to stunting caused by the srfr1-3 allele is SNC1, a Col-0 gene known to cause stunting if SNC1 expression is misregulated. The major goal of my project is to find out if SNC1 is the other gene that is required for stunting. The method I will use to find out if SNC1 is the second gene required for stunting is by crossing srfr1-3 plants with snc1-11 plants. If srfr1-3 causes stunting but needs SNC1 to do so, if the SNC1 gene is not functional theoretically plants should not be stunted. In the F2 generation, I will genotype stunted plants and determine if the SNC1 gene is activated or deactivated. If the SNC1 gene is activated in stunted plants then there is a possibility of SNC1 being the second responsible gene. If SNC1 is deactivated in stunted plants, then it cannot be the second gene responsible for stunting. The second part of my project takes an unbiased approach by mapping (or finding the location on the chromosome) the additional gene required for stunting. I will run several polymerase chain reaction (PCR) based genetic markers on a selected group of plants and compare phenotypes and genotypes to determine where the target gene is located.