

CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

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Name(s)	Project Number
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	35324
Project Title	2
Characterization and Utility of Resistance Sources against	
Resistance-Breaking Rhizomania in Sugar Beet	
Abstract	
Objectives/Goals	$S \parallel S \parallel$
Rhizomania poses a major problem to sugar beet worldwide, as it not	only causes physical harm to the
roots but also reduces the quality of sugar yield by up to 95%. Rhizon	ana resistance sources have long
been the best way to protect against beet necrotic yellow vein virus of	racio and a trace Bral inoffective
1 I needed to determine which resistance source is most effective at a	wering views titer under
resistance-breaking BNYVV	wering trus inter under
2. I compared composite root ELISA values, a commonly used measure	rement, with individual ELISA
values, to determine which is more effective and so develop tools for f	utuna projects
3. I examined the effect of temperature as a confounding variable on w	iru, titer
Methods/Materials	
I had three phases in my project. In the first phase, I conducted SLIS	s to determine the approximate
virus titer, and then verified the results with qPCRs from which I determined the exact virus titer in each	
mean virus titer as well as the spread to find out which is more informative and so useful for scientists	
Finally I examined temperature data during the course of the project and compared it to the FLISA and	
aPCR results to find any correlation between them.	
Results	
Phase 1: The Rz5 resistance source had a low average virus titer and small spread, according to the	
ELISA and qPCR.	
Phase 2: Unlike the individual ELISA, the composite foot ELISA gave no indication of spread and gave a	
large range for the median.	
Phase 3: The temperature dropped just bersit be arst narvest, which had two resistance sources, and the	
Conclusions/Discussion	
The R ₇₅ resistance source is the most effective resistance source since	it consistently lowered virus titer
and so farmers should use this resistance source to combat the resistance	ce-breaking BNYVV. Instead of
using composite root ELISAS, as is traditionally used due to its speed, scientists should conduct individual	
ELISAs to gain more precise information on virus titer. The temperatu	re drop before the first harvest
likely caused a reduction in visus titer since Rhizomania's vector, Poly	myxa betae, becomes dormant at
low temperatures, kende, temperature is a confounding variable and m	ust be considered in future projects.
Summary Statement	
I have determined that Rz5 is the most effective resistance source agai	nst resistance-breaking Rhizomania,
and developed protocols involving ELISA and temperature for future p	projects with the resistance-breaking
virus.	
Help Received	
I thenk Dr. Dishardson and also Dr. Wintermontal for heirs new mentars for this arciest. There are interested	
me to use USDA equipment and taught me basic laboratory procedures. The experiment was designed	
and conducted entirely by myself	