



Colorado Science and Engineering Fair

2025 Individual Project Abstract Form

Please print 2 copies of the completed form. Sign both copies, keep 1 for your notebook and submit 1 copy to your Regional Fair Director with your other paperwork.

Title of Project: Absorption of Glyphosate-Based Herbicide in Zea mays Plants Utilizing Zinc-Oxide Nanoparticles

Finalist's Name: Siena Parr

School and City: Dolores High School

Sponsor's Name: Dave Hopcia

Category: Plant Sciences

Division: Senior (grades 9 - 12)

Abstract (250 words or less):

This project was designed to test the usage of zinc-oxide nanoparticles in the absorption of glyphosate-based herbicides. The absorptive nature and photocatalytic activity of these nanoparticles should be conducive to the degradation of large, toxic, glyphosate molecules in soil. To accomplish this experiment, zinc-oxide nanoparticles were synthesized and stored. Four different sample groups were created. These samples were filled with soil and treated with glyphosate herbicide. After the initial incubation period, an amount of 0 mL, 2 mL, 4 mL, or 8 mL of nanoparticles were added to their respective sample. After an additional 24-hour period Zea mays seeds were planted in each sample and grown for 14 days. The plants were measured and heavily photographed throughout the experiment. After the growth period was completed, the soil samples were pH tested and examined to determine the state of their health after one round of experimentation. At the conclusion of this experiment, it was found that the Zea mays plants with higher zinc-oxide nanoparticle levels grew taller and healthier. The control sample, which lacked nanoparticles, grew the most stunted and debilitated plants. The soil pH testing at the end of the experimentation indicated that soils with higher nanoparticle levels tended to be alkaline rather than neutral. The control sample with only glyphosate had a neutral pH of around 7. These results indicate that zinc-oxide nanoparticles are effective at absorbing glyphosate-based herbicides, however, they have a stronger negative effect on soil quality.

I hereby certify that the above statements are correct and the information provided in the Abstract is the result of one year's research. I also attest that the above properly reflects my own work.

Finalist's Signature:

Date:

In addition, all students must complete the ISEF Student Checklist (1A), Research Plan, Approval Form (1B), and Checklist for Adult Sponsor (1), and any other ISEF forms required for this type of project. See the International Rules and Guidelines for form requirements. Return COPIES of all of these forms to your Regional Fair Director with you Finalist Verification/Permission Form. **A signed copy of this form must be included in your notebook.**