Root fluorescence in soybeans

Background

Many traits are of interest in soybeans. Root fluorescence might be one of the most unusual. In soybeans, the lack of root fluorescence is a dominant triati, which is curious since we typically think that dominant traits are more frequent. However, as far back as 1934, root fluorescence was observed in most soybean cultivars. Soybean cultivars are varieties that have been produced in cultivation by selective breeding. However, root fluorescence has no discernible favorable qualities, other than a “wow” factor, so that is not the trait for which these cultivars were being selected.

In further research, it was found that four different genes control the trait, three are recessive and the fourth is the only dominant one. How might this account for the trait being so widespread? What is the advantage of this trait? What else do you know about soybeans that may account for this fluorescence? Is this trait responsible for any beneficial interactions/symbiosis?

Materials

various cultivars of soybeans
paper towels
plastic bags
water
UV light source
various soil media (sterile soil-dried in drying oven to remove bacteria, native soil to your area, inoculated soil with rhizobia bacteria, other fertilizer containing soils)

Procedure

1. Germinate various cultivars of soybeans in plastic bags, wet paper towels, petri dishes as available.
2. Once germinated, check the fluorescence of the roots by shining UV light on the roots.
3. Create an hypothesis about the function of root fluorescence.
4. Plant the rooted seeds in various soil media (treated with bacteria as inoculant, untreated, sterile, etc) to determine if your hypothesis about the function of fluorescence is correct.
5. Collect data that provides evidence for your hypothesis.
6. Share your results by creating a claim, backed by your evidence, and your reasoning for fluorescence in soybean roots.