THE EFFECT OF RADIOISOTOPES ON PLANT GROWTH

Derek Boylan and Stephanie Durham

WHAT WE ARE DOING

1. Construct a cosmic ray detector from a scintillator and photomultiplier tube (PMT)
2. Establish a control environment and levels of IV using available radioactive isotopes
3. Observe and analyze effect of radiation on plants

INDEPENDENT AND DEPENDENT VARIABLES

- Independent Variable
  - Different levels and type of radioactivity in radioisotopes implemented in soil of plants (These will be calculated using PMT scintillator)
  - Control will be no radioisotopes used in the soild
- Dependent Variables
  - Plant growth and development
    - Height
    - Yield (number of beans)
    - Number of leaves
    - Qualitative observation of cells
    - Size of cells
    - Color of plant
    - Root structure
    - Diameter leaf-tip to leaf-tip

HOW WE ARE GOING TO BUILD THE COSMIC RAY DETECTOR

1. Cut scintillator to size
2. Polish edges so that PMT can detect scintillations
3. Wrap Scintillator and PMT in black tape
4. Attach photomultiplier
5. Build circuit board to process signals from PMT

RADIOACTIVITY OF AVAILABLE RADIOISOTOPES

Source	Initial Activity	Input Date	Current Activity
Bi-210	12 µCi	11/3/1972	0 µCi
Cs -137	2.3 µCi	7/1/1988	1.3 µCi
Cs -137	17.8 µCi	10/15/1965	5.92 µCi
Cs -137	3.86 µCi	10/15/1965	1.28 µCi
UO2 - Ore	(1.90 g)		
Am-241	~0.1 µCi	Oct-65	0.09 µCi
Co-60	Uknown		
Ru-106	5.5 µCi	2/2/1977	1.05E-10
Sr-90	0.1 µCi	Jun-03	0.1 µCi
Sr-90	0.1 µCi	Jun-03	0.1 µCi

WHY IT'S IMPORTANT

- The radioisotopes being tested are utilized in everyday life including the use of Am-241 in smoke detectors and medical diagnostics; Cs-137 in cancer treatment; and Sr-90 in bone cancer treatment and eye treatment
  - To avoid damaging the living organisms directly effected by these chemicals and those exposed to them in the form of waste.

IMMEDIATE GOALS

- Collect all the materials needed (including bean plants) by Monday of next week
- Build cosmic ray detector by Wednesday and test it Thursday
- Plant the bean plants on Tuesday without exposure to radioisotopes (if plants are available at this time)
- Begin exposure of plants on Friday as well as observations and analysis