The Effect of Radiation on Different Stages of Plant Growth

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Cosmic Ray Detector Update

We have done calculations according to the procedure laid out by this procedure:

$\Delta\Omega=(A/4\pi R^{\wedge}2)*4\pi$

Where $\Delta\Omega$ equals the subtended solid angle (in steradians) of the cone the two detectors make, A equals the area of the paddle, and R equals the distance from the center of one paddle to a corner of the other.

$flux=\Delta\Omega*Fv*A$

Where Fv equals the published value for flux at sea level, which equals 0.66/(cm squared*min*steradians)

Existing Setup - 1.50/(cm squared*min*steradians)

Larger sized paddles (14cmx10cmx1xcm) - 9.19/(cm squared*min*steradians).
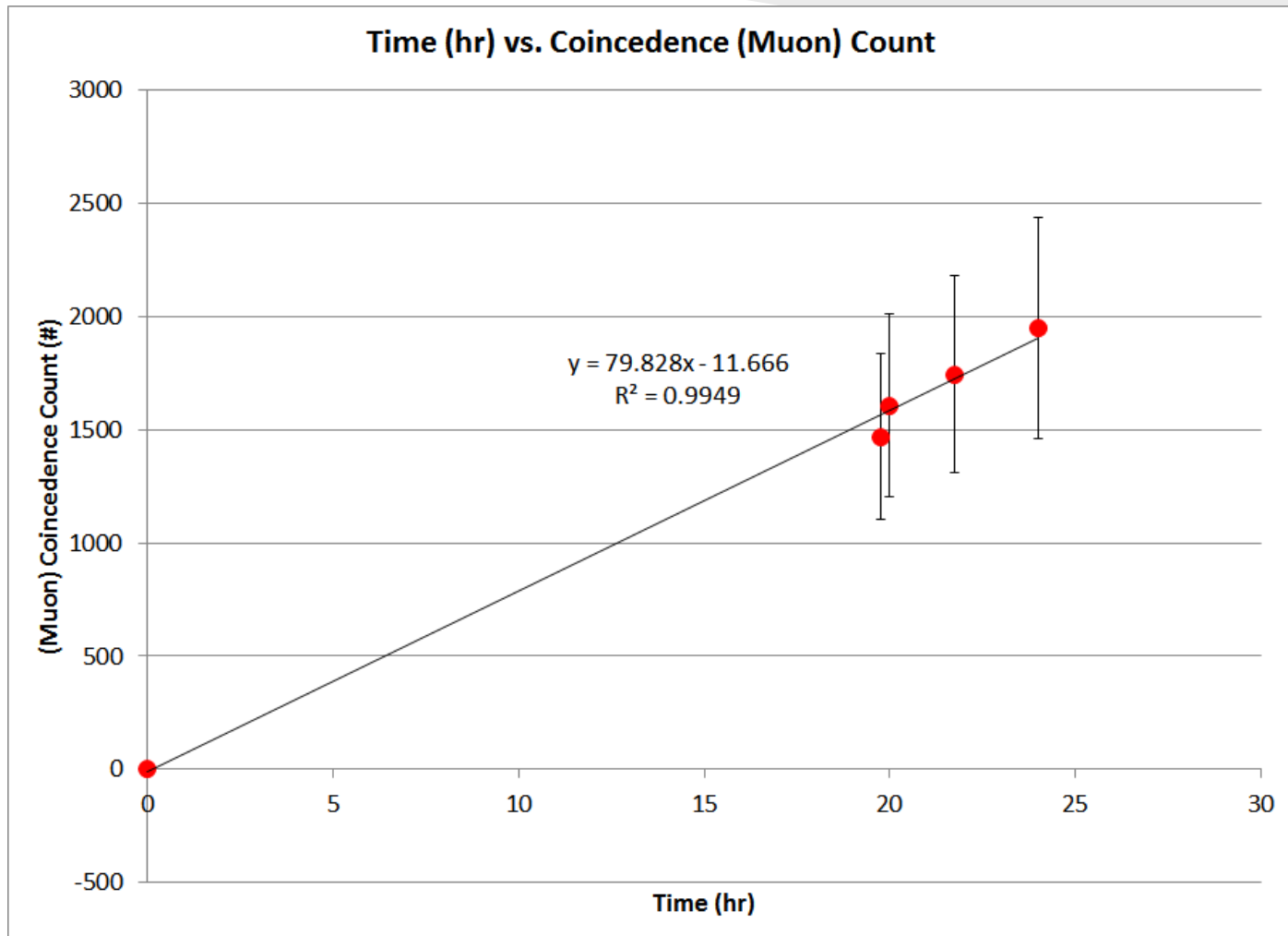
Increase in flux of 613%

Muon Counting

- Since our calculations suggested that larger detectors would be more efficient we will build new scintillators and compare the experimental and theoretical gain
- In addition, we are going to try to remove random coincidences occurrences with a third or even fourth detector,analyzing each individual coincidence (i.e. when there is a coincidence between 1 and 2, 2 and 3, etc.).
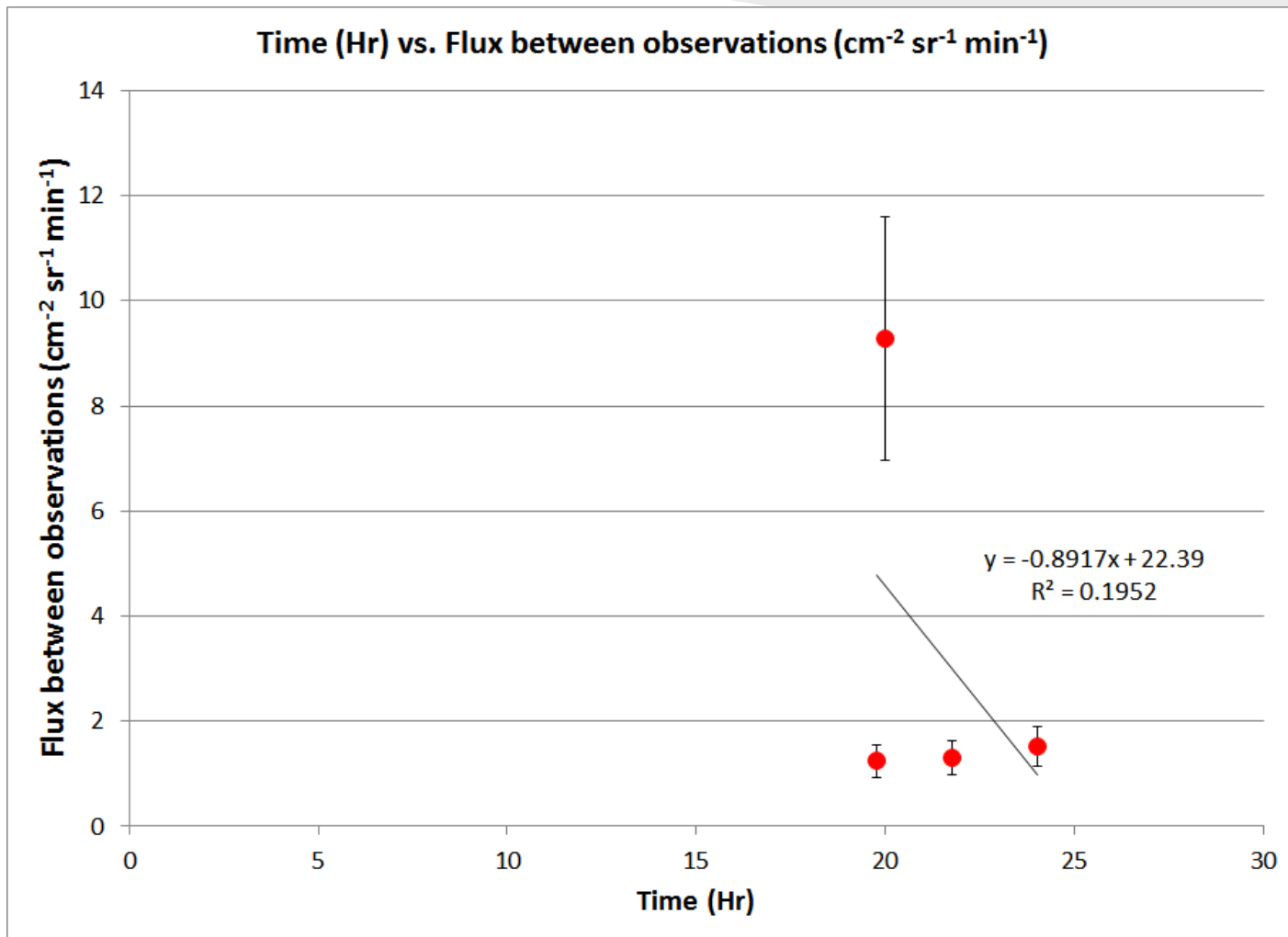
Results from Preliminary Test Trial

Time (Hours)	Count	Flux between observations	Total Flux
0	0		
19.75	1468	1.24	1.24
20	1607	9.27	1.34
21.75	1744	1.3	1.34
24	1948	1.51	1.35

Results Cont.

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Time (Hr) vs. Flux between observations (cm^{-2} sr^{-1} min^{-1})

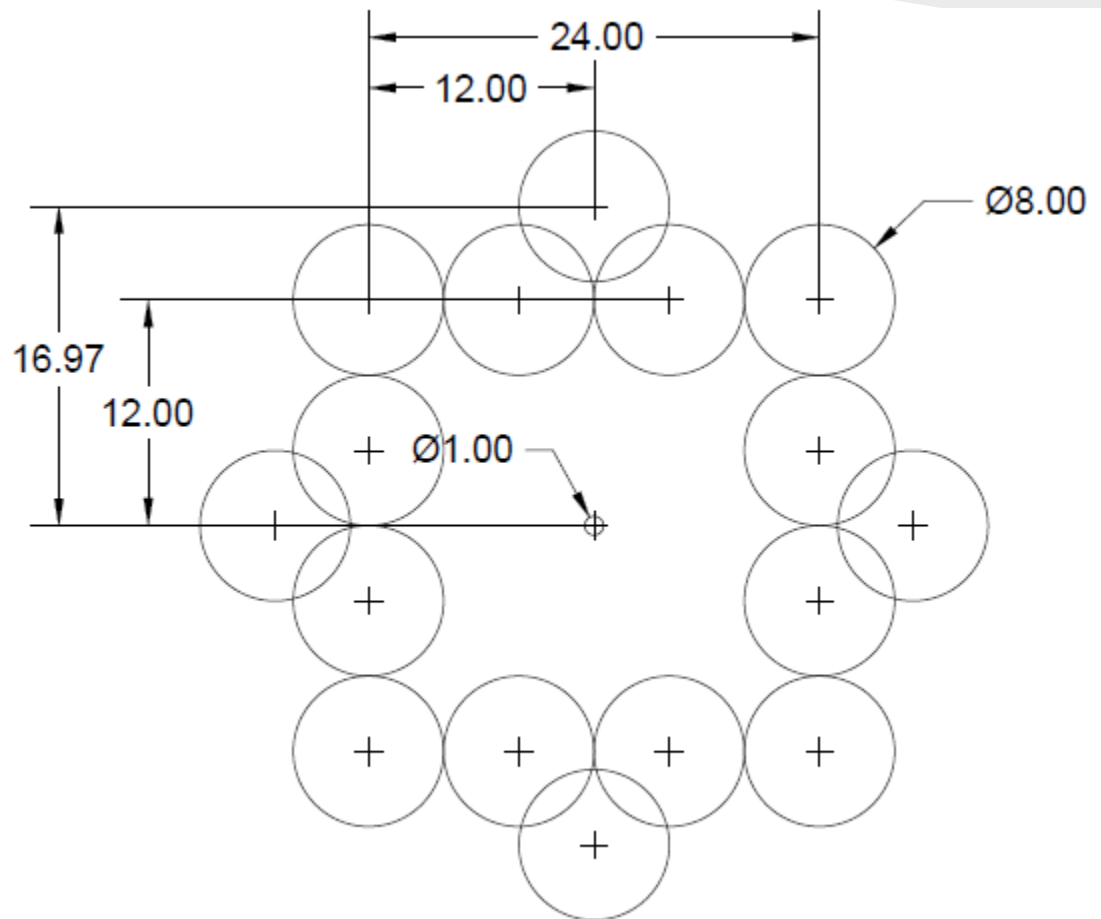$y = -0.8917x + 22.39$
$R^2 = 0.1952$

The Effect of Radioisotopes on Bean Plants

Independent variable: different doses of gamma and beta radiation for 3 hours everyday

Distance from Source (cm)	Gamma Cesium - 137 (mrem/hr)	Gamma Through Soil Cesium - 137 (mrem/hr)	Total Gamma dose (mrem)	Beta Strontium - 90 (mrem/hr)	Total Beta Dose (mrem)
12.65	0.105	0.004	0.327	0.230	0.690
14.75	0.077	0.002	0.237	0.213	0.639
16.97	0.058	0.001	0.177	0.156	0.468
19.80	0.043	0.0003	0.130	0.120	0.360

Schematic

This is the desired schematic for placing the beans in soil once they are germinated. In this setup, there will be two levels of independent variable (two distances away from the source) each with eight repeated trials. In addition to this set up, a second, larger, design will be used to add two more levels of independent variable.

Stage Growth Experiment

After the most beneficial form and dosage of radiation is determined, it will be tested on bean plants at different stages of development. It will be tested on the seeds as well as on plants 1, 2, 3, 4, and 5 weeks after germination.

Began Germination Tuesday:
- 106 Blue Lake Beans - Dose
- 20 Golden Wax Beans - Stage Growth