Magnetopriming to Enhance Sugar Snap Pea Germination for Future Space Agriculture

Lee, Dong Gyu (School: Saipan International School)
Lee, Dong Hyun (School: Saipan International School)
Kim, Lya (School: Saipan International School)

In today's world, research about growing plants in space is being done against challenges in disoriented directions and slow growth rate of radicles. While plants on Earth shoot roots downward due to gravitropism, plants in microgravity conditions shoot roots unaffected by gravity, creating more disoriented root directions. Radicle Emergence Rate and Radicle Growth Rate—factors that we have created for the study—in space are generally lower in microgravity conditions due to lack of gravity. To address these problems, our team decided to magnetoprime the sugar snap peas and attach the magnets on one side of the petri dish to create a force to guide the plants' roots. Microgravity condition of space was created using an Arduino clinostat by rotating the petri dish. Here we report that the magnetoprimed peas had significantly enhanced Radicle Orientation Index, Radicle Emergence Rate, and Radicle Growth Rate compared to non-magnetoprimed sugar snap pea seeds. More specifically, there was an average difference of 73.4 degrees in the Radicle Orientation Index. Looking at the Radicle Emergence Rate, the average rate of magnetoprimed seeds was 1.28 times faster than the average rate of non-magnetoprimed seeds. Lastly, on average, the Radicle Growth Rate of magnetoprimed seeds was 1.67 times the rate of non-magnetoprimed seeds. Combining these three significant results, we hope to find solutions to the problems that are found in growing plants in space and enrich the quality of future research in plants in space by opening new gates of alternative agricultural sites.

Awards Won: