Orange Is the New Green; From Waste to Water Absorbent BioPolymer: How Can Orange Peels Help Plants Resist Drought?

Achour, Mehdi (School: Bartlesville High School)

Fresh water is of vital importance to farmers, but nowadays, unpredictable weather patterns and extended drought threaten food producers' access to an adequate supply. One solution in combating drought might be Superabsorbent Polymers (SAP's). Most SAPs are manufactured from acrylic polymers which have no biodegradability and are not environmentally friendly. The purpose of this study is to make a low-cost, sustainable, biodegradable hydrogel from orange peels and avocado skins. My Hypothesis is: If orange peels and avocado skins are mixed and pre-treated using heat and sunlight, then the product would be a tri-dimensional macromolecule that is capable of retaining water in soil because fruit-pectin is rich in polysaccharides which, under certain conditions, can bond with the avocado's phenyl compounds, polymerise and condense into a hydrogel when added to water. In this experiment, an Organic mixture was prepared from pectin and avocado natural oils through the process of emulsion polymerization. Its ability to absorb and retain water in soil was tested, then compared to potassium polyacrylate, and applied to real life situations. The acrylic SAP had a superior absorbency. However, the Organic mixture displayed a better water retention capacity, which promoted seed germination, plant growth, and helped them resist drought throughout a period of 2 weeks. My hypothesis was supported by my results. A cheap, natural water-absorbent was produced using only fruit waste, sunlight, and heat. This method is worth investigating on a larger scale as it has various applications in agriculture, the biomedical field, and the treatment of wastewater.

Awards Won:
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