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Radiation Fields, Effects and Risks in Human Space Missions (5)

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SPACE RADIATION IN A LONG-TERM HUMAN MISSIONS: RISK ASSESSMENT ON THE MOON
AND IT'S IMPACT ON THE PLANTS

Abstract

There is an elevated radiation levels on the lunar surface than on the Earth due to the existence of intrinsic magnetic field on Earth that protects us from harmful space radiation. Since round trip from Moon will take few months and to Mars at least about two years, which would expose the astronauts to harmful radiations; therefore shielding and protecting strategies are certainly required before astronauts are sent for long duration space travel. After reviewing several effects on space radiation which mostly explains the impact of ionizing radiation as a mutagen on plant growth and changes caused by it at the genetic level; a survey of plants and plant parts such as the roots, seeds, bark, flowers, leaves and fruits that act as an anti-radiation tool and it's usefulness is done. This study elucidates the effects on some plants' physiology and metabolism while considering any genetic changes. This article gives a review on the effect of lunar radiation on plants; possible solutions to them; and the usefulness of specific plants in absorbing radiation in the lunar habitat. This will also help future agronomic applications in Moon and Mars. Although, many engineered materials block a spectrum of radiations, but the plants being responding to these radiation fields and their effects can be clearly studied, evaluated and understood for scientific purposes giving us the opportunity to explore more in this area of research. Finally, the details of plants that are resistant to space radiation and their biological mechanism is discussed along with possibilities of using such novel techniques for protecting human health during long-term space travel.