A novel method for synthesis of phytic acid ($InsP_6$) for potential in agriculture and disease cure

At DBT's Regional Centre for Biotechnology (RCB) Faridabad, team of researchers headed by Dr. Pinky Kain, RCB found internalization of fluoresceinated Phytic acid ($InsP_6$) (III) into the root and leaf cellular systems and its subsequent enhancement of the chlorophyll content in whole seedlings. Dr. Kain's findings demonstrate that $InsP_6$ can be used as a growth enhancer on the model plant *Arabidopsis thaliana*. The effect of compound (III) was then tested on *Drosophila melanogaster*. It was observed that the insect can easily ingest the compound, and fluorescence was carried over to the eggs, larvae, and pupae, showing that it survives these stages in the fly's development cycle without any degradation. These results would be useful for studying the role of $InsP_6$ in the intact live cells or tagging them to study development of neuronal cells and receptor function.

$InsP_6$ is a direct precursor for inositol pyrophosphates, such as $InsP_7$. These pyrophosphates are fundamental to a large number of biological processes. The studies on the fluoresceinated tethered phytic acid could have far reaching implications on its efficacy for human health and treatment of diseases (cancer/tumor and glioblastoma) and for understanding phosphorous recycling in the environment, especially for plant systems and soil. The compound has a potential to be use as a marker for *in vitro* and *in vivo* plant and animal cell systems.

$InsP_6$ is a second messenger molecule in cellular systems. Due to its antioxidant properties, it has potential to cure many diseases. It is a principal storage form of phosphorus in plants, dry fruits, seeds, rice, wheat, bran and many other edible foods. Our studies describe a new novel, simple and convenient two-step synthesis process to synthesize fluoresceinated aminohexanol tethered inositol hexaisphosphate (III) form of it and its binding with protein 2P1M. With the use of techniques such as UV-vis, NMR, and FT-IR, its effects were tested in model systems like *A. thaliana* and *D. melanogaster*.

In future fluoresceinated $InsP_6$ could help inducing the defense responses in plants in case of infections by supplementation and help the agricultural industry. The compound (III) has the potential to be used as a tag for studies to mark the neurons or for looking at the effect of various compounds that are hazardous for human health.

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