

# Enhancing Agricultural Productivity

## Nuclear Techniques for Efficient Nutrient and Water Management for Agricultural Crops

Philippine Nuclear Research Institute scientists are developing precision farming methods using radioisotopes and stable isotope tracers such as nitrogen-15 to determine the right amount and proper timing of fertilizer application at different growth stages of crops.

Soil moisture neutron probe is being used to optimize irrigation scheduling, while carbon-13 and oxygen-18 isotopes are used to evaluate and assess the effectiveness of different irrigation technologies. These techniques are

employed to the nation's most important crops such as rice and corn.

Results show that better practices can increase fertilizer utilization up to 70 percent. Appropriate irrigation scheduling can improve crop water use efficiency and minimize losses by around 25 percent.

These will serve as bases for updating the decades-old recommended levels of fertilizer and water inputs in agricultural production.



Monitoring and measurement of soil moisture using Soil Moisture Neutron Probe



Fabrication and testing of air moisture sampling device for partitioning soil water evaporation and crop transpiration

## Plant Growth Promoters from Radiation-Processed Natural Polymers

Radiation-induced degradation of natural polymers is a promising application of ionizing radiation to develop natural bioactive agents. Polysaccharides, which are degraded by radiation, yield oligosaccharides (polymers with shorter chains). These oligosaccharides had been shown to have elicitor and plant-growth promoting properties.

PNRI scientists have developed Plant Growth Promoters (PGPs) from radiation-processed natural polymers such as carrageenan and chitosan. The effects of these PGPs are being tested on rice, mungbean and peanut.

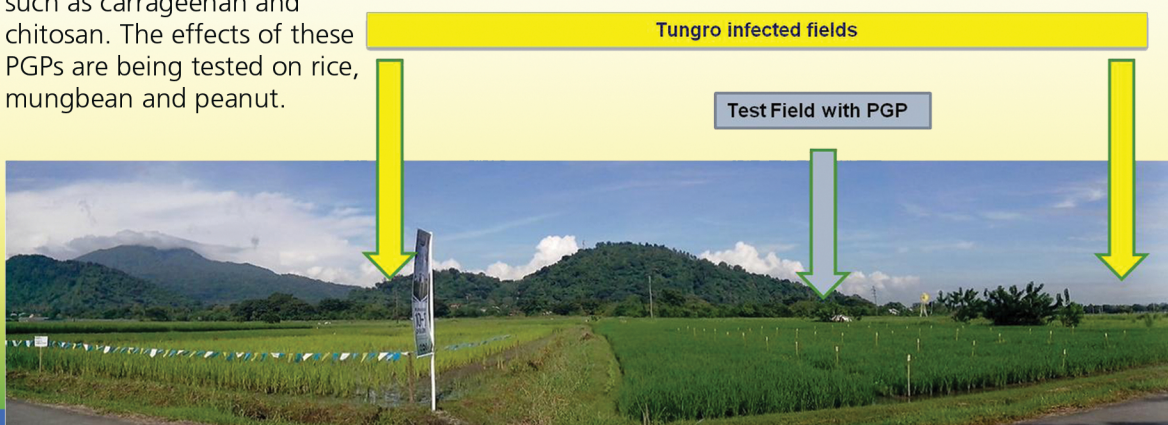


PGPs from carrageenan and chitosan

Results of pot experiments showed that the PGPs from irradiated carrageenan and chitosan increased the yield of mungbean by an average for two seasons of 310% and 194%, respectively.

For peanuts, results showed an increase in yield during the wet season of 346% for carrageenan and 270% for chitosan.

Field test on rice sprayed with PGPs resulted in the crops showing no signs of rice tungro bacilliform virus infestation.



The rice tungro experiments at the University of the Philippines Los Baños