

Soft electron radiation for the management of Adzuki bean weevil, *Callosobruchus chinensis* (L.)

POLURU VENKATA RAMI REDDY

UNU-Kirin Fellow from India

Radiation and Information Technology Laboratory

Adzuki bean, (*Vigna angularis*), is one of the most popular legumes in Japan. Adzuki bean weevil, *Callosobruchus chinensis* (L.) (Coleoptera: Bruchidae), causes considerable damage and yield loss during storage. Fumigation with methyl bromide has been the widely applied management practice to control *C. chinensis*. However, methyl bromide has to be phased out by 2005 in developed countries and by 2015 in developing countries owing to its ozone depletion effect. Hence there is an urgent need to find an alternative strategy to control this pest. Soft electron (low-energy electron) irradiation has been considered to be more safe and cost effective with little damage to the environment. We conducted laboratory experiments to evaluate the efficacy of soft electrons in controlling *C. chinensi* as well as to assess their safety to seed germination.

Our results confirmed that the soft electron treatment at 200 kV with as little as 6 minutes exposure time, can effectively control all the life stages of adzuki bean weevil with 80-100% reduction in adult emergence. Even the weevils that survived the treatment, were not able to multiply further. Hence this treatment brings about the total control of adzuki bean weevil. The DNA comet assay revealed that electron treatment caused DNA damage in the insect larval cells and this might be the cause of sterility and mortality. In addition, the highest dose tested, (20 kGy at 200 kV), of the soft electron treatment had no adverse effect on the seed germination and therefore can even be recommended for treating the seed germplasm material as well as seed material to be used for sprouts. Unlike gamma radiation, soft electrons did not cause any DNA damage to the seed embryo, thus proving to be safe for seed quality.

Considering factors like low penetration and being amenable for direction regulation, soft electron radiation has a great scope for use in food grain disinfestation.