

**Title** Free radicals in velvet bean seeds (*Mucuna pruriens* L. DC.) and their status after  $\gamma$ -irradiation and conventional processing

**Author** Rajeev Bhat, Kandikere R. Sridhar and Brij Bhushan

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### Abstract

Free radicals in velvet bean seeds, a nutraceutically valued legume were examined by electron spin resonance (ESR) spectroscopy. The status of free radicals present naturally, after irradiation and conventional processing were recorded by entrapping small quantities of seed samples in potassium chloride powder in ESR quartz tubes. The ESR signal at  $g=2.0055(\pm 0.0001)$  were more prominent in seed coat than cotyledon portion. Gamma irradiation of seeds (for hygienization and quarantine purposes) at different doses (0, 2.5, 5, 7.5, 10, 15 and 30 kGy) resulted in a dose-dependent increase of signal intensity at  $g=2.0055$  in seed coat as well as in cotyledon. In seed coat, a weak triplet (satellite peak) accompanied the central line. This satellite peak (left line 'g') can be used as an authentic indication of radiation treatment of *Mucuna* seeds and can be employed as one of the detection methods for similarly irradiated legume seeds possessing prominent seed coat. In cotyledon, irradiation at high doses (15 and 30 kGy) showed a significant reduction of the ESR signals ( $P<0.05$ ), which has been attributed to possible increase in free radical scavengers (particularly polyphenols). Some of the common processing practices such as microwave roasting, flame heating and pounding also generated free radicals similar to irradiation treatments. Results of the present study substantiate the suitability of employing ESR technique for detection of free radicals present naturally or produced after radiation and conventional processing. The results of this study might also be feasible for successful application of gamma irradiation of *Mucuna* seeds for quarantine purposes.