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# Radiation induced mutations in amla (*Emblica officinalis* Gaertn)

B. SENTHAMZIH SELVI* AND V. PONNUSWAMI
Horticultural College and Research Institute, Tamil Nadu Agricultural University, COIMBATORE (T.N.) INDIA

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## SUMMARY

An experiment was conducted at Horticultural College and Research Institute, Tamil Nadu Agricultual University, Coimbatore during 2003-2005 to workout mutations in gamma rays induced populations in amla (*Emblica officinalis* Gaertn). Scions of five amla varieties *viz.*, BSR-1, Kanchan, Krishna, NA-7 and Chakaiya were irradiated with different doses (1.0 to 5.0 kR) and grafted on rootstocks. After studying the success on survival per cent BSR-1 alone was selected for further study with the treatments fixed as 0.5, 0.75, 1.0, 1.5, 1.75, 2.0, 2.5 and 5.0 kR. Observations were recorded for chlorophyll mutations and other viable mutations in amla grafts. Gamma ray treatments produced three types of chlorophyll mutants *viz.*, xantha, chlorine and viridis. With chlorine mutants being predominant, chlorophyll mutations recorded in the $V_1M_1$ generation showed progressive decrease in the frequency of chlorophyll mutation with increasing doses. Seven types of viable mutations were realized in this experiment *viz.*, shoot bifurcation, compact growth habit, leaf types, multiple shoot at a single node and blind and stout shoots with only the first formed leaves. Economically important mutant for compact growth was obtained but the frequency of mutants were of very low magnitude.

**Key words :** Amla, Mutations, Compact mutant.

Induction of mutation appears to be promising not only for the creation of new variability, but also to correct a defect in an otherwise superior variety. According to Broertjes (1968), the main advantage of mutation induction in crops is the ability to change one or few characters of an outstanding cultivar without altering the remaining genotype. Mutation breeding methods are gradually becoming more and more successful in vegetatively propagated plants as demonstrated by the rapid increasing number of commercial mutants, predominantly of ornamentals. So far about 477 mutants of various vegetatively propagated plant species have been exploited commercially in horticulture and agriculture. In woody plants, such as fruit trees, the role of mutation breeding has, so far, been restricted as a consequence of the size of the plants, the length of the vegetative phase and the formation of chimeras (Broertjes, 1977). In contrast to the ornamental crops, mutation breeding of woody plants, including fruit trees, meets several difficulties. The size of plants, and the length of the vegetative phase from irradiation of bud sticks to selection of mutants interferes with large-scale breeding programme and, since mutation breeding is a number game, this reduces the chance of useful mutants. In addition, rapid techniques for vegetative propagation are generally not available, not to speak of adventitious bud technique *in vivo* or *in vitro* for the production of non-chimeral mutants. Furthermore, breeding is often for quantitatively inherited characters, which are difficult to select and recover. But even for directly visible characters such as fruit colour, screening must be continued over a long period so that the recovered valuable genotypes do not carry additional undesirable mutants like inferior fruit form or reduced yield. Several scientists, mostly Europeans, published early work on mutation breeding in fruit crops and consequently can be considered pioneers in this field. Many such work have been reported by Granhall (1953) in apples and pears, Bauer (1957) in ribes and Hough and Weaver (1959) in peaches.

## MATERIALS AND METHODS

For the present experiment, amla scions of pencil thickness consisting of 10 nodes (dormant buds) from seven year old mother trees were collected and treated under a temperature range of 25±2° C. A physical mutagen (Gamma rays) was employed for the treatment of scions. Gamma rays treatment was given from the Gamma chamber – 900 installed at Tamil Nadu Agricultural University, Coimbatore. Gamma ray source was $^{60}Co$ in 1000 curie, emitting 5000 rads per minute at the time of irradiation The treated scions were stored in a wet gunny cloth at room temperature till treatment and thereafter till grafting on the rootstock. The treated scions were cleft grafted on the same day on one year old wild amla seedling rootstocks. Both the treated and untreated grafts were planted in pots and received uniform standard operations (or) after care. In the present study, the survival of amla grafts decreased gradually as the dose of gamma rays increased but the decrease was rather sharp at 4.0 and 5.0 kR for all five amla varieties (BSR-1, Kanchan,

* Author for correspondence.