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Short Communication

Induced leaf and inflorescence mutations in *Vigna radiata* (L.) Wilczek

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Induced mutagenesis has played an important role in improvement of greengram. So far fourteen cultivars have been developed following induced mutagenesis [1]. Various types of mutations induced include mutation for high yield, resistance against diseases, early, late, dwarf, twin pod, lobed pod, variegated leathery leaf, serrated leaf margin, multiple leaf, green cotyledon, bright yellow seed and some other mutations of academic interest [2, 3].

In the present investigation, an attempt was made to induce genetic changes in two well established greengram varieties (TARM 1 and Sujata) following gamma irradiation and to isolate desirable mutants in segregating generation. For the purpose, dry, uniform seeds of both the varieties were each irradiated with four doses (30 kR, 40 kR, 50 kR and 60 kR) of gamma rays at Bhaba Atomic Research Centre, Trombay. Irradiated seeds and their controls were sown in EB II Section of OUAT, Bhubaneswar in randomized complete block design with three replications to raise M_1 generation. Seeds of the separately harvested M_1 plants were used to raise M_2 generation in RBD with three replications. Thirty families were raised in each treatment in each replications. Various morphological mutants were isolated throughout the growth and development period.

A wide spectrum of morphological mutations *viz.*, unifoliate, bifoliate, quadrifoliate, pentafoliate, simple leaf, leathery leaf, leaf with serrated margin, bushy plant type, early, late, tall, dwarf and mutants with modified inflorescence were induced. A brief idea on the characteristic of these mutants are presented here.

Unifoliate : The mutant was observed in all gamma irradiated populations of both varieties at a frequency ranging from 0.08 to 0.10 per cent. Instead of compound trifoliate leaf as in the control (Fig. 1a), the mutant had compound leaf with single leaflet.

Bifoliate : This mutant was found in different treated populations of both varieties at a frequency ranging from 0.30 to 0.80 per cent. Leaves of the mutant were compound with two leaflets.

Quadrifoliate : The frequency of this mutant in different treated populations ranged from 0.36 to 2.07 per cent. The mutant had four leaflets (1.b) in its compound leaf instead of three in normal plants.

Pentafoliate : Five leaflets were found in the compound leaf of the mutant plants (1.c) and its frequency ranged between 0.16 to 0.70 per cent.

Among the four mutants observed showing variation in leaflet number the latter two may be useful in crop improvement due to increase in total leaf area.

Serrated leaf mutant : Only one mutant of this kind was observed in 50 kR gamma irradiated population of variety Sujata. The mutant was relatively short (10 cm in height) with condensed internodes. Leaves were yellowish green in colour with deeply serrated margin (Fig. 1d). It flowered five days earlier than its parent. There was pod development but no seed setting due to high degree of sterility. Developing pods were short and thin but all dropped before complete development. Induction of similar mutation in greengram was also reported earlier [4].

Leathery leaf : Leaves were normal bluish green in colour with leathery feeling (Fig. 1e). The frequency of this mutant was very low (0.009 per cent) and was only observed in 40 kR treated population of variety Sujata.

Simple leaf with modified inflorescence : Instead of compound trifoliate leaf and condensed raceme inflorescence (Fig. 1f) as evident in control the mutants had simple leaf with modified inflorescence (Fig. 1h). The inflorescence of the mutant was represented by bracts only arranged in a condensed axis. Only one such mutant was observed in 40 kR treated population of Sujata.

Mutants with modified inflorescence : Mutants with modified inflorescence were observed in 40kR and 60 kR treated populations of variety Sujata and in 30 kR and 40 kR treated population of variety TARM 1. Morphological features of the mutant was also identical to the simple leaf mutant with modified inflorescence except that leaves were normal compound trifoliate (Fig. 1g). Lamprecht (1958) had reported about induction of similar mutation in pea [5].

Besides, the above morphological mutants of academic interest, some morphological mutants having specific agronomic value were also isolated in M_2 populations. A brief description of these mutants is presented here.

Early : Early mutants (Fig. 1i) were observed in the treated population of both varieties at a variable frequency ranging from 0.01 to 0.43 per cent. Mutant matured around 62 ± 3 days about 10 days earlier to parents and produced seed yield ranging between 2.2 to 2.6 g as against 2.8 to 3.0 g in parents. These mutants could be also useful for multiple cropping situation.

Tall and late mutant : This mutant was observed in extreme low frequency in 40 kR gamma irradiated populations of the variety Sujata. Mutants were tall (36 ± 5 cm) with broad light green leaf (incised in Fig. 1j) and they matured (at 100 days) 15 days later than their parent. Mutant plants produced long, bold pods with moderate seed setting. Seed yield of the mutant was at par with variety Sujata. Production of more biomass and seed yield at par with parent suggests

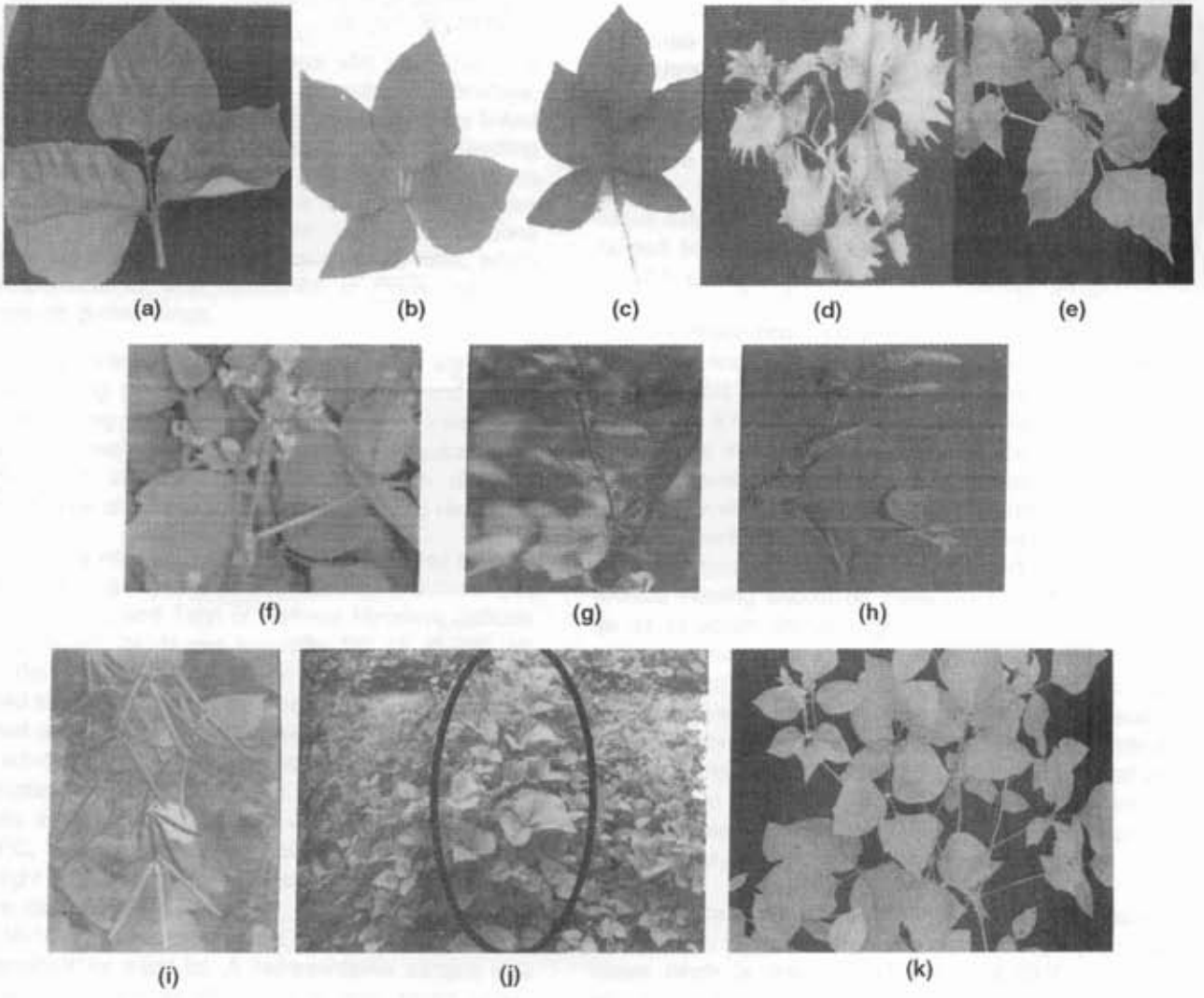

Fig. 1(a) Normal trifoliate leaf, (b) Quadrifoliate, (c) Pentafoliate, (d) Serrated leaf (e) Leathery leaf, (f) Normal inflorescence (control), (g) Modified inflorescence with normal trifoliate leaf, (h) Modified inflorescence with simple leaf, (i) Early maturing, (j) Tall and late maturing, (k) Bushy mutant.

the suitability of the mutant as a fodder as well as seed purpose variety.

Dwarf : Dwarf mutants were relatively common to different treated populations of both varieties. Its frequency ranged between 0.24 to 0.5 per cent in treated populations. Mutants were short with height of 24 ± 2 cm as compared to 41 ± 3 cm in the parents. One of the dwarf mutant isolated in 40 kR treated populations of Sujata was also early (65 days) maturing with seed yield at par with the parent Sujata. This mutant could be useful for multiple cropping situation.

Bushy mutant : Bushy mutants were observed in 30 kR and 40 kR treated population of variety Sujata at a frequency range of 0.15 to 0.21 per cent. Mutant plants produced 10-12 branches spreading outwards from main axis (Fig. 1k) and the seed yield of the mutants ranged between 2.4 g to 2.8 g.

Mutants matured 10 days later than the parent Sujata and there was no significant improvement in seed yield. Due to higher biomass and canopy the mutant could be useful as a fodder or cover crop.

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