

INDUCTION AND SELECTION OF EARLY FLOWERING AND
LESS SHATTERING MUTATIONS IN RICE

By

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Thesis

Submitted in partial fulfilment of the requirements
for the degree of

MASTER OF PHILOSOPHY

in the

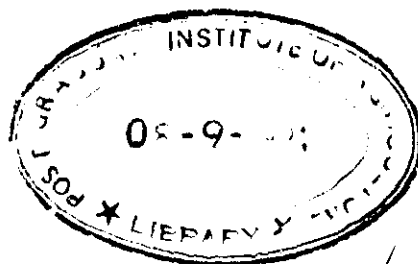
POSTGRADUATE INSTITUTE OF AGRICULTURE

of the

UNIVERSITY OF PERADENIYA

SRI LANKA

November 1992.

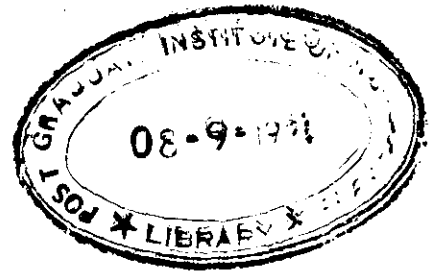


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ABSTRACT

The present study was undertaken in view of inducing and selecting less shattering and early maturing mutants in rice variety Pd 85-3, while retaining its cold tolerant ability by Gamma irradiation. Preliminary investigations were carried out to find the LD₅₀ value, which was identified as 32 kR. Thereby the most effective dose rates were estimated as 30 and 35 kR Gamma rays.

The first generation after irradiation (M₁) consisting of 5000 plants per treatment were grown in Yala 1988 at Gannoruwa research station. At maturity M₁ plants were harvested separately but no selection was done. The M₂ and M₃ populations were grown at Pussallawa rice breeding station under cold climatic conditions. M₂ population was grown in Yala 1989 where 50,000 plants per treatment were grown in progeny rows. Selection for early maturing (less than 150 days) and less shattering (less than 10%) was done in this generation. The selected mutants were grown in progeny rows in Yala 1990 in M₃ generation where further selection was carried out.

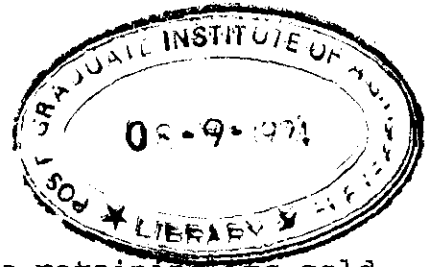
Study of 500 randomly selected plants in M₁ generation showed a reduction in germination, tiller number, seedling and plant height. Further, a very high sterility (more than 55%) and a survival percentage of less than 50% was observed in M₁ generation. Chlorophyll mutants

such as albino and viridis were detected in M_1 and M_2 generations, but not in the M_3 generation.

The agronomic study carried out in the M_1 and M_2 generations revealed that irradiation had caused higher variability within the treated populations which tend to widen the area for selection. It also showed that Gamma irradiation had adversely affected all the mean values of the studied characteristics.

In the M_2 generation, 20 and 101 mutants were selected respectively in 30 and 35 kR populations with less than 10% shattering, which is an acceptable rate for rice in Sri Lanka. Out of these mutants, 14 matured in 130 to 135 days which is 20 to 25 days earlier than the control (155 days). Seventy nine of the mutants had less than 25% sterility, which shows their cold tolerant ability. The other 42 were moderately sterile with 25 to 50% sterility, which were more susceptible to cold.

In the M_3 generation, 46 and 62 mutants with less than 10% shattering were selected respectively in 30 and 35 kR populations. All these 108 mutants had less than 25% sterility, indicating their ability to tolerate cold. Among these mutants 27 matured in 130 to 135 days which was 20 to 25 days earlier than the control. Thus, the objective of inducing and selecting less shattering and



early maturing mutants in Pd 85-3, while retaining its cold tolerant ability was achieved.

The selected 108 mutants in M_3 generation did not show any susceptibility to Blast. Further, 105 selected mutants were dwarf and semi dwarf in nature, which is an indication of lodging resistance and high Nitrogen response. Seventy four mutants had total number of seeds more than 500. Therefore, the short stature and higher total number of seeds in these mutants may be an indication of higher yielding ability of the mutants, which has to be further evaluated in next generations.