

RADIOSENSITIVITY STUDIES IN RICE I, M<sub>1</sub> INJURY IN SEEDLING STAGE

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## INTRODUCTON

At present available information pertaining to radiosensitivity of indigenous rice varieties is inadequate. Such basic information is a pre-requisite in any mutation breeding programme the present study was, therefore, undertaken to obtain necessary information, on the radiosensitivity of popular rice varieties most commonly used in breeding programmes in Pakistan.

## MATERIALS AND METHODS

Dry seeds of five rice varieties: Basmati 370, Pak, IR 6, IR 8 and Taichung (Native) I (T (N) I), with moisture content of 14.0% were irradiated with 10-40 kR doses of gamma rays using <sup>60</sup>Co source at 35, 92.9 R/min dose rate.

Germination percentage, seedling height and root length were studied under laboratory conditions conducted in controlled environment growth room at 25 ± 1°. The seedlings were raised according to the technique of Myhill and Knozak [1]. The seeds were embedded with downward embryo orientation in thick rectangular filter paper folds. The folders were supported on the plexi-glass germination racks, which were placed in wide bottom enamelled trays (35 x 24 cm and 5 cm deep) filled with distilled water. These seed sandwiches were positioned in such a way that the seeds were just touching the water surface. Twenty five seeds per treatment per replication were sown and the experiment was replicated four times. Data were recorded after a fortnight.

## RESULTS AND DISCUSSION

It is evident from Fig.1 that germination in Basmati

370, Basmati Pak and T(N)I was enhanced from 1 to 4% by the radiation of doses. On the other hand in IR 6 and 8 germination decreased by 4 to 5% at 35 and 40 kR doses.

This slight increase in germination in Basmati 370, Basmati Pak and T(N)I may possibly be due to efficient repair mechanism of chromosomes in these mutants during germination [2]; or it may be due to the drastic effect of radiation on some germination inhibiting substances present in the seeds [3]. Both the increasing and decreasing effect of irradiation on germination has also been reported by other workers [4,5].

As is shown in Fig. 2 maximum seedling height reduction of 56 to 69% occurred in all the varieties at 40 KR. LD 50 for Basmati 370, Basmati Pak, IR 6, IR 8 and T(N)I was 33, 36, 25, and 34 kR respectively. Basmati Pak was

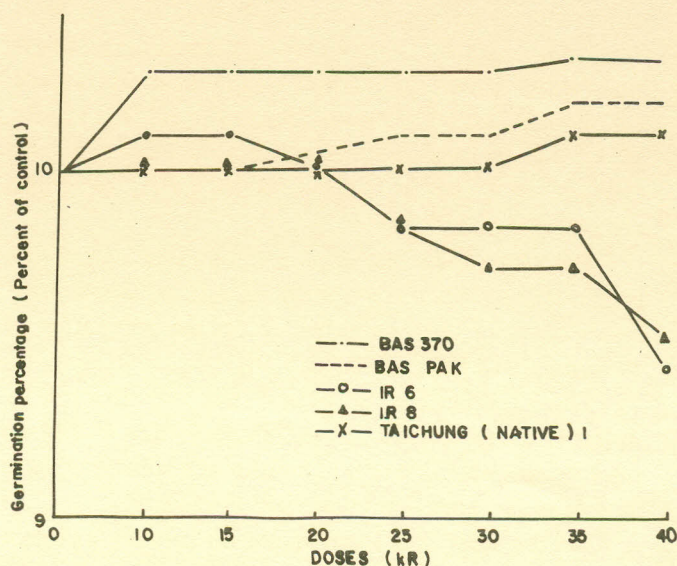


Fig. 1. Effect of gamma irradiation doses on germination percentage in rice



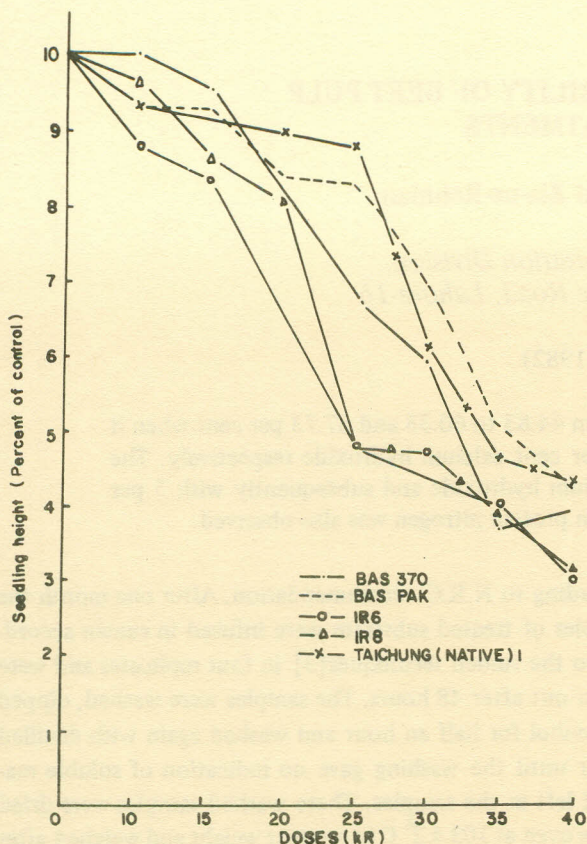


Fig. 2. Effect of gamma irradiation doses on seedling height (cm) in rice.

the most radioresistant while IR 6 and IR 8 were the most radiosensitive to gamma radiation as far as seedling length was concerned. The results are in agreement with those of many other workers [5,6,7].

Root length also decreased invariably with the increase of radiation doses, in all the varieties tested (Fig. 3). Maximum root length reduction (32 to 53%) occurred at 40 kR, the highest dose of irradiation used in these experiments. LD 50 for Basmati 370, Basmati Pak, IR 6 and IR 8 was 35, 40, 33 and 30 respectively. T(N)I was the most radioresistant and IR 8 the most radiosensitive variety to gamma rays.

The depressing effect of radiation on seedling and root length may be due to the specific effects on certain enzymes responsible for growth [8] or by the retardation of the synthesis of DNA and RNA [9,10].

Since germination in general was not affected by different doses of radiation significantly, thus it may be regarded as a poor criterion to measure the radiation effects at least in the various varieties tested in this study.

On the basis of LD 50 values for seedling and root length, it may be concluded that dose rates ranging from 33 to 40 kR for Basmati 370, Basmati Pak and T(N)I; and

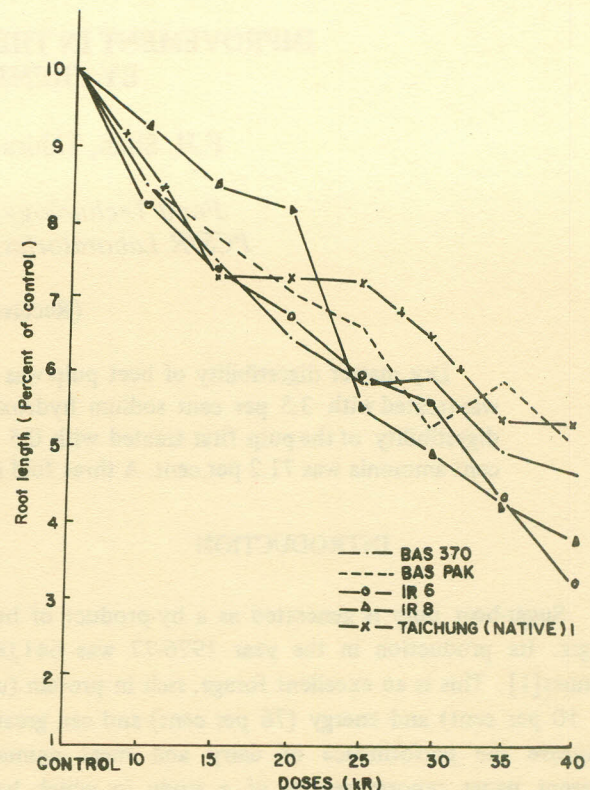


Fig. 3. Effect of gamma irradiation doses on root length (cm) in rice.

25 to 33 kR for IR 6 and IR 8 may be used, for generating increased genetic variability in these rice varieties.

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