Genetic Studies on Seed Quality Parameters and Yield Attributing Traits in Induced Population of Wheat (*Triticum aestivum* L.).

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Abstract  
One widely adopted wheat cultivar K-7903 (Halna) were induced by dry 00 kR, 05 kR, 10 kR, 15 kR, 20 kR, 25 kR, 30 kR, 35 kR, 40 kR and presoaked 00 kR, 05 kR, 10 kR, 15 kR, 20 kR doses of CO$^{60}$ gamma rays at 2.2 kR per minute intensity at the NBRI, Lucknow. In M$_1$ generation, gamma rays treated materials were sown through dibbing along with control to generate materials to genetic studies on seed quality parameters and yield and yield attributes traits in M$_1$, M$_2$ and M$_3$ generations.

In M$_1$ generation dry 15kR has been showed the maximum germination percent in the both lab (98.00%) and field (86.80%) conditions and seedling height at 14$^{th}$ days of sowing (18.32cm) as compared to other doses of gamma rays. Further, it was also noticed that minimum reproductive sterility was recorded under dry 15kR (10.49%) except the controls whereas, the between dry 30kR to 35kR dose of gamma rays was observed for LD$_{50}$.

For macro mutation studies in M$_2$ and M$_3$ generations, chlorophyll mutation as well as variation in plant type (dwarf, tall, spreading, early maturity and late maturity), spike type (awn less, long spike, short spike, bent type, branched type and glume coloured), seed type (bold, small, long, black embryo, shrivelled, deep furrowed and discoloured) were observed. Other hand in the M$_2$ generation the highest mutagenic effectiveness and efficiency were recorded under dry 15kR except M$_3$ generation. However, the dry and presoaked 05kR did not shows the those induced mutation.

For study of micro mutation, 16 randomly selected pants in M$_1$ generation from each treatments were selected and threshed separately. A trial laid in Compact Family block design with three replications. Out 12 doses of gamma rays, the dry 15kR gamma rays treatment was found most effective dose to induced mutation in wheat for economic value such as increase in yield and yield attributes traits and also induced for earliness in maturity.

Application of higher dose of gamma rays like dry 35kR, dry 40kR and presoaked 20kR were found more effective in inducing dwarfness in wheat but comparatively more deleterious than lower doses of gamma rays treatment in creating abnormalities like reproductive abnormality, spikelet sterility and shrivelled seeds etc.

In the present study, dry 15kR treatment showed that maximum genotypic coefficient of variance (GCV) for days to heading, days to maturity, no. of effective tillers/plant, grains/spike, grains per spikletet and yield/plant in M$_2$ generation. But in case of M$_3$ generation only number of effective tillers/plant was recorded to maximum GCV under dry 15kR dose of gamma rays. Higher dose of gamma rays (dry 30kR, 35kR and 40kR) were observed maximum phenotypic coefficient of variance (PCV) for days to flowering, no. of effective tillers/plant, 100 seed weight and yield/plant in both M$_2$ and M$_3$ generations as compared to other doses of gamma rays.
The experimental findings indicated that among treatments the dry 15kR showed maximum heritability in broad sense for days to heading, days to flowering, days to maturity, plant height, no. of effective tillers/plant, grains/spike, 100 seed weight and yield/plant except grains per spikelet and genetic advance revealed that it was high for no. of effective tillers/plant, grains/spike and seed yield/plant in both M2 and M3 generations. Conclusively, mutation breeding techniques specially wheat crop, the dry 15kR dose of gamma rays has been found most effective for inducing mutations of economic interest like improvement in yield and yield attributes traits.

Based on studied traits and generations the high amount of genetic variability was present for seed yield/plant, no. of effective tillers/plant and plot stand with the maximum genotypic variability observed in M2 than M3 generation. The estimated GCV for different characters was almost the same as that of PCV. Therefore it is evident, that the influence of environment on the expression of these traits was in variably low in the study.

In the present study, high heritability in broad sense coupled with high genetic advance as per cent mean was recorded for no. of effective tillers/plant and seed yield per plant. This indicates the little influence of environment in expression of these traits and prevalence of additive gene action in their inheritance, hence, are amenable for simple selection. On the other hand, the magnitude of heritability was little higher in M3 generation as compared to M2 generation.

Seed yield showed that genetically significant and positively correlated with plant stand, grains/ spike, no. of effective tillers/plant, 100 seed weight, grains/spikelet and plant height at the genotypic level in M2 generation. Almost similar trend of association of no. of effective tillers/plant, grains/ spike, 100 seed weight, plot stand, grains/spikelet and plant height with seed yield in M3 generation were observed. So suggested that top priority should be given to those traits while making selection for improvement of seed yield.

Both M2 and M3 generations showed that maximum positive direct effect on seed yield was contributed mostly by no. of effective tillers/plant, 100 seed weight grains/spike. This suggests true relationship between these traits with seed yield /plant and can be direct selection of these traits for yield improvement.

The seeds of M1 mutant lines of wheat were stored at room temperature with 10% moisture content in gunny bags and polythene bags for the 24th months. After tri-monthly intervals stored seeds was evaluated for seed quality parameters. The gradual decrease in the mean value for seed qualitative traits was observed with increase in the radiation intensity and storability whereas, gamma ray 20kR dry treatment was found superior viz. seed viability, germination percentage, speed of germination, seedling length, vigour index length and vigour index mass to as compared to other gamma rays treatments. With reference to the packaging material, the polythene bag was found to be significantly superior to gunny bag after 24th months of storage in securing for quality parameters.

Other hand storage fungi, the highest increase of fungal population was observed of *Aspergillus* spp. such as in order of *Aspergillus* spp. > *Fusarium* spp. > *Penicillium* spp.

The 40kR dry and polythene bag treatment was found to the highest per cent of control the storage fungi as compared to other treatments during storability of whea