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# EFFECT OF GAMMA RADIATION ON THE SUCKER PRODUCTION IN BANANA RHIZOMES

Eventhough all organisms are subjected to somatic mutations or sporting, the process is of peculiar importance in a seed sterile, vegetatively propagated clonal plant like banana because it is the sole source of genetic variation in it. In potatoes, which resemble bananas in being continually propagated by vegetative means, recent work shows that there is significant vatiation in yield and disease resistance among sub clones (Cockerham and Macarther, 1956). A long list of macromutations in banana is given by Simmonds (1959). There are many individual reports on somatic mutations affecting stature, plant colours, bunch and fruit characters in banana (Gross, R. A. and Simmonds, N. W. 1954; Jacob, K. C. 1952; Larter, L. N. H. 1934). If natural mutations are so frequent in this crop it is worthwhile to attempt for induction of mutations to enhance further variation. There are no published reports on any such attempts in banana.

An attempt to induce mutation in banana was made at the Banana Research Station, Kannara, Trichur during 1976—1977. 'Nendran' a popular 'French plantain' variety in Kerala was chosen for the induction of mutation by gamma radiation. Five months old rhizomes of 45 well grown Nendran plants in which flower initiation was already over were collected and cleared off ail roots and debrises found on them. The pseudostem was cut back at 10 cm above the rhizome level. The rhizomes thus collected were divided into 9 groups of 5 each and subjected to 8 different doses of gamma radiation from a $CO_{60}$ source having a dose rate of 23.55 KR/hour at 32°C, keeping one group as control. The doses ranged from 1 KR to 8 KR with an interval of 1 KR. Since each rhizome was a bulky material having an average of 20 cm width and 30 cm height the effective dose received by the two sides of each rhizome varied a lot. The rhizomes were kept in the natural position on the radiation platform and the side facing the source was getting the correct dose and hence designated as 'correct dose side' (CDS) which was markedfor later reference. In the control rhizomes one of the sides was arbitrarily fixed as the correct dose side. The results obtained are given in the table 1.

The irradiated rhizomes along with the control were planted at one meter spacing in shallow trenches taken 2 meter apart in the nursery plot for sucker initiation. Care was taken to keep the CDS of each rhizome facing the same direction for easy reference. Sucker counts were taken separately for the CDS and opposite sides on the 60th day of planting for fixing the LD - 50 dose and a survival count was done after another 2 months.

**Table 1**

**Mean number of Suckers produced by banana rhizome exposed to different doses of gamma radiation.**

| Treatments | Mean no. of suckers/rhizome on CDS at 60th day of planting | Mean no. of suckers/rhizome on opposite side at 60th day of planting | Mean no. of suckers survived on CDS at 4th month of planting | Mean no. of suckers survived on opposite side at 4th month of planting |
|---|---|---|---|---|
| Control | 2.2 | 1.6 | 1.2 | 1.2 |
| 1 kR | 1.4 | 1.4 | 0.6 | 1.4 |
| 2 kR | 1.4 | 1.6 | 0.2 | 0.4 |
| 3 kR | 1.5 | 1.2 | 0.2 | 0.8 |
| 4 kR | 0.2 | 1.4 | 0.2 | 0.6 |
| 5 kR | 0.2 | 1.6 | 0.2 | 0.8 |
| 6 kR | 0.4 | 1.8 | 0.0 | 0.8 |
| 7 kR | 0.6 | 1.4 | 0.2 | 1.0 |
| 8 kR | 0.2 | 1.2 | 0.2 | 0.8 |
| C. D. (.05) | 1.039 | 0.487 | 0.693 | 0.938 |
| C. D. (.01) | 1.398 | 0.685 | 0.822 | 1.260 |

There was significant difference between the control and treatments in the production of suckers on the CDS whereas the difference was not significant on the opposite side. This shows that the radiation effect was significantly reduced when the gamma rays traversed through the thick rhizome tissues which contain more than 50 per cent water. There are many reports on the reduction of radiation sensitivity with the increase in water content (Caldecott, R. S. 1955 a &b; Ehrenberg, L. 1955; Caldecott, R. S. 1959).

On the CDS the critical dose which gave significant reduction in sucker production was found to be 4 KR and above. But considering the drastic reduction in sucker production at and above 4 KR level the 50 per cent lethal dose could more appropriately be fixed around 3.3 KR.

The data on survival count show that the number of suckers in the control plants survived 4 months after planting was significantly higher than those in the irradiated rhizomes except at 1 KR dose. But between different doses there was no significant difference. From a comparison of the total suckers produced at the CDS on the 60th day of planting under each dose with those survived after 4 months, it is seen that the decline was more at the first three doses namely 1 KR, 2 KR and 3 KR, than the higher doses. In other words the apparant prolificity in sucker production at the initial three doses was nullified by the drastic decline that followed.

At the opposite sides, as we may expect, there was no significant difference in the number of suckers survived after 4 months of planting between the control and treatments. This was natural since the radiation effect on sucker production was almost nil at the opposite sides.


## സംഗ്രഹം

വാഴമാണത്തിൽ ഗാമാ രശ്മികളുടെ പ്രഭാവം മനസ്സിലാക്കാൻ വേണ്ടിയുള്ള ഒരു പ്രാഥമിക പരീക്ഷണം 1976 — 77ൽ കണ്ണാറ വാഴഗവേഷണ കേന്ദ്രത്തിൽ നടത്തുകയുണ്ടായി . GOO ന്യൂൻ ഇനത്തിൽപ്പെട്ട വാഴകളുടെ അഞ്ചുമാസം പ്രായമെത്തിയ മാണങ്ങൾ പിഴുതെടുത്താണ ഗാമരശ്മി ഏല്പിച്ചതു്. 1 KR മുതൽ 8 KR വരെയുള്ള 8 വ്യത്യസ്തമാത്രകൾ അയുഞ്ചുവീതം വരുന്ന fflosTDsasgnraJ ഏല്പിച്ചശേഷം അവയെ കന്നല്പാദനത്തിനായിro)oJorosmQQ)1(D4 നട്ടു. താരതമ്യ പഠനത്തിനുവേണ്ടി ഗാമാരശ്മികൾ പതിപ്പിക്കാത്ത അഞ്ചുമാണങ്ങൾ നിയന്ത്രണമായും നടുകയുണ്ടായി. 4KRനും അതിനുമുകളിലും മാത്രകളിൽ ഗാമാരശ്മികൾ പതിപ്പിച്ച മാണങ്ങളിലെ 'പതനവശ'ത്തിലെ കന്നല്പാദനം നിയന്ത്രണത്തിലേതിനെ അപേക്ഷിച്ചു് പ്രകടമാംവിധം കുറവായികണ്ടു. എതിർവശത്താകട്ടെ രശ്മിപ്രഭാവം തീരെയില്ല എന്നാണ കണ്ടതു്. കന്നല്പാദനത്തിന്റെ അർധമാരകമാത്ര **3.3 KR** ആണെന്ന കണക്കാക്കുകയുണ്ടായി.


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