Journal of Tropical Agriculture 33 (1995) : 70-71

GAMMA RAY INDUCED VARIATION FOR YIELD IN SWEET POTATO

Mutagenic agents can be beneficially utilised for developing relatively superior varieties in sweet potato. This study was undertaken to standardise dose and plant organ to be irradiated and to identify varietal tolerance to gamma irradiation.

Table 1. Effect of gamma rays on tuber yield, tubers per vine, tuber length and mber girth in sweet potato (vM4 generation)

Treatments (gamma rays)	Tuber yield, g/vine			Tuber/vine			Tuber length (cm)			Tuber girth (cm)		
	FC	RC	RT	FC	RC	RT	FC	RC	RT	FC	RC	RT
Muttavella												
Control	243	226	345	1.8	2.5	2.5	19.1	19.3	19.0	19.1	19.3	19.0
500 r	295	271	393	2.0	2.8	2.7	19.5	19.5	19.5	19.5	19.5	19.5
1000 r	340	275	400	2.1	2.8	2.7	20.5	19.5	20.0	20.5	19.5	20.0
1500 r	248	303	435	2.1	2.8	2.9	20.3	20.0	20.5	20.8	20.0	21.5
2000 r	356	356	496	2.3	3.1	3.2	20.1	20.3	21.0	20.1	20.3	21.0
2500 r	337	348	503	2.3	3.1	3.3	20.4	20.8	21.0	20.4	20.8	21.0
Kanhangad local												
Control	231	226	196	2.1	2.0	1.8	15.5	15.5	16.0	15.5	15.5	16.0
500 r	234	239	244	2.1	2.1	2.2	16.6	16.9	16.5	16.6	16.9	16.5
1000 r	295	271	282	2.5	2.1	2.4	17.3	16.8	15.8	17.3	16.8	15.8
1500 r	299	311	323	2.5	2.1	2.7	16.9	18.0	16.8	16.9	18.0	16.8
2000 r	359	342	333	2.9	2.4	2.7	17.2	17.9	17.2	17.2	17.9	17.2
2500 r	375	330	344	3.0	2.0	2.8	17.7	17.8	17.0	17.7	17.8	17.0
Bhadrakalichuvala												
Control	328	178	260	1.9	2.1	2.0	16.0	15.2	14.0	16.0	15.2	14.0
500 r	206	269	299	2.1	2.7	2.2	17.9	15.5	14.8	17.9	15.5	14.8
1000 r	315	252	317	2.4	2.7	2.3	15.9	15.8	14.8	15.9	15.8	14.8
1500 r	337	314	320	2.5	3.0	2.3	18.0	16.3	15.5	18.0	16.3	15.5
2000 r	381	344	393	2.7	3.1	2.6	18.0	15.5	15.5	18.0	16.5	15.5
2500 r	374	320	390	2.8	3.1	2.6	18.6	16.6	15.5	18.6	16.6	15.5
CD(0.05)												
Treatments	-	87.0	136.4	0.47	0.69	0.71	2.90	1.72	2.86	-	1.57	-
Varieties	-	-	55.7	0.19	0.28	0.29	1.18	0.70	1.17	0.88	0.64	0.63
Exposures	66.1	50.2	78.7	0.27	0.40	0.41	-	0.99	-	-	0.90	-

In this experiment, three varieties of sweet potato viz., Muttavella, Kanhangad Local and Bhadrakalichuvala selected one each from the low, medium and high mutagen tolerant groups respectively were tried. Fresh cuttings, rooted cuttings and rooted tubers (300 each) from each of these three varieties were exposed to 500, 1000, 1500, 2000 and 2500 r of gamma rays at a dose rate of 0.162 Mr h^{-1}. For raising vM_1 generation, the gamma irradiated and control tubers and vines were planted on the next day of exposure in mounds of 75 cm diameter at the rate of 5 cuttings or tubers per mound. During planting, special

care was taken to have only one node above the soil. The vines were periodically examined to isolate chlorophyll deficient and morphological variants. The vM_2 generation was raised by taking representative 3-4 cuttings from the basal, middle and top portions of each vine. The vM_2 plants were harvested and all mature vines were selected to raise vM_3 generation. From vM_3 generation five plants of uniform appearance were selected from each treatment which gave higher yield. In each generation, the observations on tuber yield per vine, tubers per vine, tuber length and tuber girth were recorded and data were analysed statistically (Snedecor and Cochran, 1975).

Results indicated that in fresh cuttings, Bhadrakalichuvala gave the maximum tuber yield per vine (381.0 g) when irradiated with 2000 r gamma rays (Table 1). In rooted cuttings, it was 356.5 g with same dosage and in rooted tubers 503.5 g with 2500 r. The rooted tubers of Muttavella recorded the maximum tuber number per plant (3.3) with 2500 r of gamma rays. The higher exposures (2000 and 2500 r) of gamma rays were effective in increasing the tuber yield and tuber number per vine in the three varieties. Saulite (1983) reported increased tuber number in potato by higher exposures of gamma rays. Nayar and Rajendran (1987) reported 20-25% increase in tapioca by gamma irradiation. Due to lethality in higher exposures, the vine number per unit area was less. Lesser number of vines might have utilized the available nutrients, water, space and light in an effective manner by producing more number of sizeable tubers per vine and thereby increasing the tuber yield. Miu *el al.* (1973) obtained higher tuber yield by using gamma irradiation at 5000 r. The tuber length was maximum (21.0 cm) in Muttavella when the rooted tubers were irradiated with 2000 and 2500 r gamma rays. The higher exposures (1500, 2000 and 2500 r) of gamma rays produced higher frequency of tuber number, tuber length and tuber girth variants and this may be another reason for increased tuber yield. Irradiation of rooted cuttings was found to be more economical or beneficial compared to fresh cuttings and rooted tubers.

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