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Mutation Breeding Newsletter

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RESEARCH NEWS

Practical value of radiation induced wheat mutations in Hungary

Between 1959 and 1970, at the Agricultural Research Institute of the Hungarian Academy of Sciences, Martonvásár, various wheat varieties were treated with gamma rays during the early stages of development. Our practical aim was to select favourable mutants from varieties which were of value but not satisfactory with respect to one or two characters. [1-4]

In order to carry out irradiation during the early development stages, self-fertilised seeds from different varieties were put to soak, after which the burst seeds were vernalised in a refrigerator for 50 days. Every ten days a different group of samples were treated with 1-4kR of ^{60}Co gamma rays. After the completion of the vernalisation and treatment, the seedlings were planted at Martonvásár in the open field. Comprehensive observations were carried out on M_1 and subsequent generations and finally the promising mutant lines were included in performance trials.

Several mutant lines were examined in C-line performance trials in 1971. The yield of the mutant lines was considerably lower than that of the initial varieties.

From 1965 onwards mutants possessing several positive morphological and biological characters were crossed among themselves. The hybrid population was improved by individual selection and lines produced from the best elite seeds were evaluated in microplot experiments.

The majority of the mutant hybrids had to be rejected, since they were deficient with regard to stiffness of straw and disease resistance. Of the lines produced, a selected progeny from the Bezostaya mutant x Ranka mutant cross proved to be the best. The 1975-77 yield results of four lines selected from this combination are presented in Table 1. The lines originate from the 1965 cross, 11th generation. Bezostaya 1 is the normal winter wheat standard.

Table 1. Yield results for winter wheat lines produced from mutant hybrids (Martonvásár)

Variety, line	Origin	Plant height cm	1000-grain-weight gm	Grain yield q/ha 1975	1976	1977	Average yield q/ha	Grain yield as % of Bezostaya 1
Bezostaya 1 St.		100	40,9	49,7	53,7	57,9	53,7	100,0
Mv-103	(Bez. Mut. x Ranka Mut.)	97	41,0	64,8	65,5	74,8	68,3	127,1
Mv-104	"	101	45,7	63,1	59,9	70,0	64,3	119,7
Mv-105	"	99	48,8	-	64,0	75,3	69,6	129,6
Mv-106	"	103	47,3	-	64,9	60,7	62,8	116,9

Table 2. Yield results for winter wheat line Mv-103 produced from mutant hybrids (Hungarian National Agricultural Variety Testing Institute, regional performance trials)

Variety, line	Plant height cm	1000-grain-weight g	Grain yield q/ha 1976+	1977++	Grain yield as % of Bezostaya 1
Bezostaya 1 St.	103	42,5	56,7	49,1	100,0
Mv-103	97	40,2	66,0	60,4	119,4

\+ = average of 6 stations

++ = average of 14 stations

The Mv-103 line was evaluated at 6 stations of the National Agricultural Variety Testing Institute in 1975-76. Due to its yielding ability, which surpasses that of the present varieties, and its favourable standing ability the line has been accepted by the National Variety Testing Council as a provisional under the name Mv-103 bread wheat. Apart from the yielding ability the Mv-103 provisional is also characterised by a high degree of straw stiffness and favourable plant height. Lodging was not experienced even when a yield of 8.92 t/ha was produced, the highest yet achieved. The foliage is fairly erect, so the lower parts of the plant are not overshadowed. The wheat is dark green in colour, the stalk is of medium thickness and when ripe the colour becomes whitish. It tillers well and shows no adverse effect to an increase in stand density. The spikes are always produced at approximately the same height. At the tip, the spike is fairly compact with partially developed awns. The grains are short, pale red in colour and moderately hard. With mechanical sowing the 1000 grain weight varies from 40-42 g, depending on the place of cultivation and the stand density. In 1976, the hectolitre weight was 83.5 kg. According to the 1975 data, the crude protein content was 12.8%, compared with 12.1% for Bezostaya 1. The 1976 farinograph evaluation at Martonvásár showed the flour to be of A2 quality; the baking data were also favourable.

Mv-103 is moderately resistant to powdery mildew; the data of rust infection experiments show it to have medium susceptibility to leaf rust and less susceptibility to stem rust.

Mv-103 belongs to the same ripening group as Bezostaya 1. It has been found to possess good winter hardiness and it survived the dry summer of 1976 without a reduction in 1000 grain weight. In wheat monoculture experiments at Martonvásár, not only did it produce a good yield, but it took first place among the 44 varieties and provisonals included in the experiments. This shows that it is also well able to endure the unfavourable conditions obtaining in a monoculture.

The other lines presented in Table 1 are also promising; they possess a high 1000 grain weight, are completely resistant to powdery mildew and are capable of competing with the varieties now under cultivation. It seems probable that further provisionals will be produced from them in the years to come.

Table 2 gives the 1976 and 1977 yield data for the prospective variety Mv-103 in the national variety trials. It can be seen from the results that the mutant hybrids are superior to the standard.

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(Contributed by G.Y. Szilágyi, Agricultural Research Institute of the Hungarian Academy of Sciences, Martonvásár).

Inducing disease resistant maize mutations via ionizing radiation

The resistance of maize mutant lines (M_5-M_6) to smut (*Ustilago zeae*), maize mosaic dwarf virus and *Helminthosporium turcicum* was studied. The initial material (seeds of inbred lines and hybrids) was irradiated by α- rays and fast neutrons. The lines were sown on an infected field and artificially inoculated for a period of three years. Smut inoculation was effected by injecting a spore suspension, mosaic virus by use of leaf aphids, and Helminthosporium by placing infection material consisting of finely ground diseased leaves in the plant's leaf spirale. Smut and mosaic infections were scored in percent of diseased plants vs. healthy ones, while Helminthosporium resistance was evaluated visually after Sheludko's (1961) scale. Several disease resistant induced mutant lines have been selected, namely: Pr-169, which has a high resistance to maize smut, Ph-249 -Helminthosporium resistant, and Wh-661 and Wh-669 - resistant both to Helminthosporium and to mosaic virus.

REFERENCE

Indutsirane na ustojchivi na bolesti mutatsii pri tsarevitsata posredstvom jonizirashta radiatsiya. Genet. Sel. 2(5) (1976)416-419.

(Contributed by M. Stoilov, Akademiya na Selskostopanskite Nauki, Sofia, Bulgaria, Inst. po Genetika; A. Popov, Akademiya na Selskostopanskite Nauki, Sofia, Bulgaria, through INIS).

Mutation breeding in Jute

In jute the extremely narrow spectrum of natural variability has been the major impediment to crop improvement. Mutation breeding in *Corchorus olitorius* var. JRO 632, using gamma rays and thermal neutrons with the primary aim of inducing and accumulating variability, resulted in the isolation of more than 400 morphological variants. Further studies on their morphology, cytology and genetics led to establishing 136 true breeding viable mutants [1]. The mutated genes in some cases had pleiotropic effects and the phenotypes resembled plants belonging to other species and even other genera [2].

Some of the mutants had agronomically desirable traits like taller plant height and greater base diameter than the control. An extensive inter-mutant hybridization programme resulted in 116 different hybrid progenies. Selections for promising recombinants were made in the F_2 and their breeding behaviour was studied up to the F_5 generation. Two tall mutants and three selections from the inter-mutant crosses were found to be high fibre yielders in the initial evaluation trials. These five strains were further tested at four centres for three years and at one centre for two years in advanced yield trials of the All India Coordinated Research Project on Jute and Allied Fibres. The increased yield of these TJ cultures at one centre, namely, Bahraich was statistically significant for all the three years. At three other centres yield of TJ cultures was equal or superior to the parent for three years. In view of their outstanding performance in the advanced trials at Bahraich, they have been promoted to Field Evaluation Trials in farmers' fields at several locations.

Mean fibre yield (kg/ha) of Trombay Jute mutant strains during 1975-77

Varieties	Locations				
	Bahraich	Barrackpore	Katihar	Kendrapara	Krishnagar
TJ-23	2547	2580	1912	2556	2880
TJ-26	2798	2776	1989	2690	2726
TJ-32	2974	2546	2009	2359	2690
TJ-40	2720	2718	1964	2659	2270
TJ-42	2843	2491	2059	2265	2798
JRO 632	2368	2511	1975	2435	2981

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(Contributed by D.C. Joshua, R.G. Thakare and N.S. Rao, Biology and Agriculture Division, Bhabha Atomic Research Centre, Trombay, Bombay - 400 085.)

The effect of the planting date on performance of early maturing rice mutants

The Bangladesh rice varieties IRATOM 24 and IRATOM 38 are mutants of IR8 (see MBNL 6, 6). Following irradiation with gamma rays, the mutants were selected for their earlier ripening.

Following their release as varieties, more detailed agronomic studies were carried out with the mutants. Figure 1 illustrates the differential reaction of the mutants and their "mother variety" with regard to the length of period from planting to maturity as affected by different planting dates. The degree of earliness of the mutants relative to IR8 is obviously modified by the planting date. Yield trials revealed that each variety has its optimal planting dates for achieving maximum yield (Table 1). For intense crop rotation patterns, crop productivity per day may be a very important figure, which is also given in Table 1. The results of the study indicate that productivity of IR8 is best when planted late in January for the Boro season, where as IRATOM 24 and IRATON 38 benefit from earlier planting. When grown in the Aus-season, the optimal planting date for all three varieties seems to be around mid-April with results as given in Table 2.

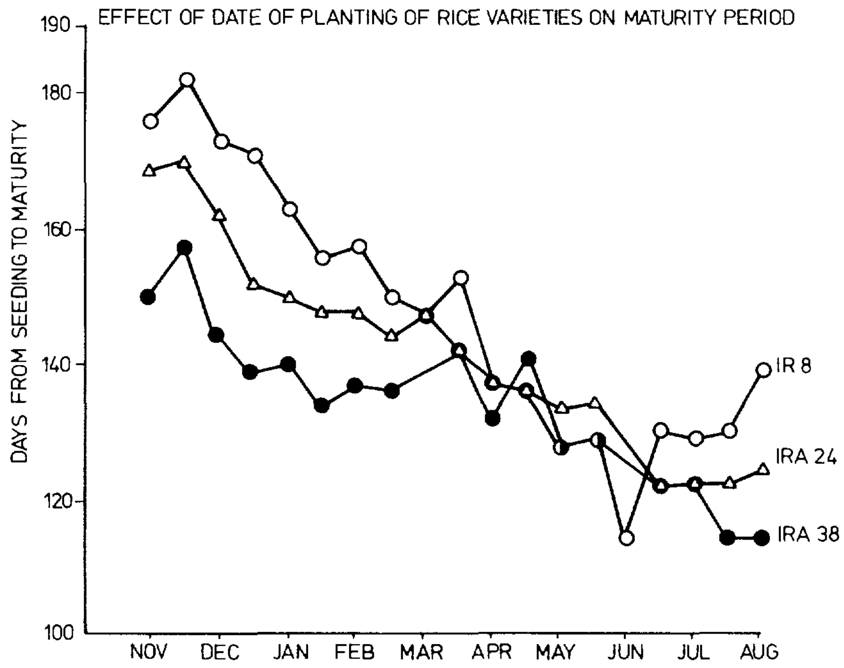

Table 1. Reaction of rice varieties to planting dates during Boro season (1976/77 experiments; means of three replicates)

Variety	Planting date	Crop duration (days)	Grain yield (t/ha)	Straw yield (t/ha)	Grain production per day (kg/ha)	Grain+straw production per day (kg/ha)
IR8	21 Dec	165	3,34	3,49	20,2	41,4
	5 Jan	163	3,65	3,28	22,4	42,5
	20 Jan	152	4,51	3,28	29,6	51,2
IRATOM 24	21 Dec	151	4,00	4,20	26.5	54,3
	5 Jan	150	4,31	3,89	28,7	54,7
	20 Jan	134	3,74	3,69	27,9	55,4
IRATOM 38	21 Dec	138	3,12	2,92	22,6	43,8
	5 Jan	138	3,95	3,74	28,6	55,7
	20 Jan	124	2,92	3,03	22,8	46,5

Table 2. Performance of rice mutant varieties and their parent variety during Aus-season with optimal planting date 19.4.1977

Variety	Crop duration (days)	Grain yield (t/ha)	Straw yield (t/ha)	Grain production per day (kg/ha)	Production grain and straw per day (kg/ha)
IR8	133	4,77	3,54	35,9	62,5
IRATOM 24	123	3,28	2,57	26,6	47,5
IRATOM 38	116	3,85	2,62	33,2	55,7

These studies demonstrate the importance of looking closely at physiological characteristics and ecological reactions of induced mutants as they may deviate in a rather complex way from those of the "mother variety".

(Data supplied by Lutfur Rahman and A.K. Kaul, Institute of Nuclear Agriculture, Mymensingh, Bangladesh).

Useful mutant lines of rice and soybean

Since the Radiation Breeding Laboratory, KAERI, Seoul was established, mutation induction programmes were carried out with soybean, rice, barley, mungbean and ornamental plants. In these studies, many mutants were selected. Some agronomically useful mutant lines of rice and soybean are under advanced testing. Their attributes are listed in the following table: (seed samples would be available upon request).

Mutant line	Parent variety	Mutagen treatment	Main improved attributes (compared to parent variety)
RICE			
KAR-398	Kokwang	X-ray 20kR	Protein 30% higher than parent, culm 20 cm shorter, 20 days earlier
KAR-2	Jinheung	" "	Slightly earlier, 10cm shorter
KAR-50	"	" "	High yield, straw stiffness
KAR-197	"	" "	Narrow leaf, dwarf type
KAR-281	"	" "	Protein 20% higher
KAR-151	Milsung	" "	20 days earlier
KAR-1-35	Pungkwang	Gamma-ray 30 kR	Vigorous early growth,
KAR-9-151	"	" "	Larger grain,
KAR-10-156	"	" "	Resistance to blast disease

Mutant line	Parent variety	Mutagen treatment	Main improved attributes (compared to parent variety)
KAR-21-201	Tongil	X-ray 20kR	Vigorous early growth,
KAR-27-270	"	" "	Resistance to shattering,
KAR-30-326	"	" "	Resistance to blast disease
KAR-34-333	"	" "	25 days earlier
<u>SOYBEAN</u>			
KAS-CS-15-15-9	Chungbuk-Baik	Thermal neutron 20×10^{12} Nth/cm^2	Resistance to shattering
KAS-1-2-103	Clark	EMS 0.01M	Larger seed size, light brown hilium (TGW increased from 168 to 220-260 g)
KAS-2-1-87	"	"	(TGW increased from 168 to 220-260 g) yellow hilium
KAS-2-1-560	"	"	" brown "
KAS-2-2	"	"	" " "
KAS-2-16	"	"	" "
KAS-2-18	"	"	" " "
KAS-2-23	"	"	" " "
KAS-2-33	"	"	" " "
KAS-2-34	"	"	" yellow "
KAS-2-43	"	"	" " "
KAS-2-44	"	"	" brown "
<u>SOYBEAN</u>			
KAS-7-5	KAERI 150-7 from Gwangwa, Gyngi-Do	Gamma-ray 15kR	High yield, lodging resistance
KAS-7-14	" "	" 25kR	" "
KAS-7-15	" "	" "	" "
KAS-3-21	KAERI 200-3 from Chuncheon, Gangwon-Do	" 15kR	Earlier maturity, lodging resistance
KAS-3-24	"	" "	" "
KAS-3-25	"	" "	" "
KAS-10-59	KAERI Acc. No. 390-10 collected from Jecheon, Chungchungbuk-Do	" 25kR	Early maturity

(Contributed by S.H. Kwon, J.H. Oh, J.R. Won, J.R. Kim and H.S. Song, Radiation Breeding Laboratory, Korea Atomic Energy Research Institute, Seoul, Korea).

Commercialized mutants of vegetatively propagated crops

A survey as of 19 May 1978 revealed that about 200 mutants of various vegetatively propagated plant species are utilized commercially in agriculture and horticulture. About 160 of them came in use since 1970. The following table gives a breakdown into plant groups. More detailed information about many of those mutants can be found in the book "Application of Mutation Breeding Methods in the Improvement of Vegetatively Propagated Crops" by C. Broertjes and A.M. van Harten (Elsevier Scientific Publ. Company, Amsterdam, 1978, US$57.-)

Plant group	Number of commercial mutants	Total number
Root and tuber crops	Potato 1	1
Ornamentals		
Tuber and bulb crops	Dahlia 23, Lilium 2, tulip 2, Polyanthes 2	29
Pot plants	Begonia 21, Guzmania 1, Streptocarpus 8, Achimenes 8, Azalea 10	48
Cut flowers	Alstroemeria 14, carnation 2, Chrysanthemum 78, roses 4	98
Garden plants	Portulaca 7, Bougainvillea 1	8
Woody plants	Abelia 1, Malus 1	2

Plant group	Number of commercial mutants	Total number
Fruit crops		
Temperate tree fruits	apple 4, apricot 1, cherry 3, peach 1	9
Small fruits	black currant 1	1
Tropical fruits	grapefruit 1	1
Other crops	peppermint 2	2
Total		199

(Contributed by C. Broertjes, I.T.A.L., Wageningen, The Netherlands)

Mutant germplasm collections

According to information received till May 1978 from our readers, mutant collections exist of ca. 130 plant species. Addresses of institutes can be made available upon request.

Plant Species	Number of Institutes	Approximate no. of mutants
Abelia grandiflora	1	
Abelmoschus esculentus	1	
Abelmoschus manihot	1	
Achimenes sp.	1	
Allium cepa	1	
Antirrhinum majus	2	480
Arabidopsis thaliana	1	20
Arachis hypogaea	6	200
Areca catechu	1	
Avena sativa	8	70
Bactris gasipaes	1	
Begonia masoniana	1	4
Begonia rex-cultorum	1	2
Begonia hiemalis	1	10
Beta vulgaris	1	
Brassica campestris	1	
Brassica juncea	2	
Brassica nigra	1	
Brassica oleracea	2	6
Budleia davidii	1	5
Cajanus cajan	1	
Camellia sinensis	1	
Canna sp.	1	12
Capsicum annuum	3	156
Capsicum sp.	1	
Chrysanthemum indicum	2	
Chrysanthemum morifolium	1	20
Cicer arietinum	3	25
Citrus limon	1	5
Citrus paradisi	2	12
Citrus reticulata	1	4
Citrus sinensis	1	10
Citrus sp.	2	45
Corchorus capsularis	3	150
Corchorus olitorius	2	125
Cucumis melo	1	
Cucumus sativus	1	
Cucurbita vulgaris	1	
Cymbopogon flexuosus	1	15
Cynodon sp.	1	300
Dolichos lablab	1	
Ecballium elaterium	1	2
Euphorbia pulcherrima	1	3
Forsythia sp.	1	20
Gladiolus gandavensis	1	100
Gloxinia hybrida	1	
Gycine max	16	2250
Gossypium anomalum	1	
Gossypium barbadense	1	
Gossypium herbaceum	1	
Gossypium hirsutum	1	8
Gossypium thurberi	1	
Helianthus annuus	1	

Plant Species	Number of Institutes	Approximate no. of mutants
Hibiscus esculentus	1	
Hibiscus moschatus	1	
Hippophae rhamnoides	1	
Hordeum vulgare	47	4500
Hyoscyamus niger	1	
Ipomoea batatas	1	40
Larix decidua	1	5
Lens esculenta	2	15
Linum usitatissimum	1	100
Lolium perenne	1	
Lotus corniculatus	1	
Lupinus angustifolius	1	30
Lupinus cosentinii	1	30
Lycopersicon esculentum	10	710
Lycopersicon pimpinellifolium	1	
Malus communis	1	35
Malus domestica	1	30
Malus lemoinei	1	2
Malus pumila	2	550
Mangifera indica	1	
Manihot esculenta	1	
Manihot utilissima	1	
Matthiola incana	1	40
Medicago spp.	1	
Mentha arvensis	1	50
Mentha cardiaca	2	55
Mentha citrata	1	20
Mentha piperita	2	29
Mentha spicata	1	10
Morus alba	2	30
Morus latifolia	2	15
Nicotiana tabaccum	2	
Olea europaea	1	
Oryza glaberrima	1	3
Oryza sativa	44	3420
Pelargonium peltatum	1	2
Pelargonium zonale	1	10
Pennisetum americanum	2	500
Pennisetum typhoides	1	2
Petunia hybrida	2	60
Pharbites nil choisy	1	80
Phaseolus aureus	3	38
Phaseolus mungo	2	70
Phaseolus radiatus	1	50
Phaseolus vulgaris	6	525
Pinus banksiana	1	35
Pisum sativum	9	1850
Pisum sp.	1	120
Poa pratensis	1	
Prunus armenciaca	1	10
Prunus avium	5	85
Prunus domestica	1	4
Prunus persica	3	7

Plant Species	Number of Institutes	Approximate no. of mutants
Psophocarpus tetragonolobus	1	5
Pyrus communis	2	24
Pyrus serotina	1	2
Raphanus sativus	1	
Ribes nigrum	1	10
Saccharum sp.	3	89
Saintpaulia ionantha	1	2
Secale cereale	4	50
Sesamum alatum	1	2
Sesamum capense	1	2
Sesamum indicum	3	183
Sesamum radiatum	1	2
Solanum khasianum	1	8
Solanum melongena	2	16
Solanum tuberosum	6	30
Solanum tub. ssp. andigenum	1	7
Sorghum vulgare	2	5
Streptocarpus sp.	4	30
Stylosanthes sp.	1	
Thuja plicata	1	
Trifolium alexandrinum	1	4
Trifolium pratense	2	7
Trifolium sp.	1	
Triticale	4	27
Triticum aestivum	42	9500
Triticum aestivum ssp. spelta	2	60
Triticum monococcum	3	45
Triticum sp.	2	80
Triticum turgidum conv. durum	15	1580
Triticum turgidum conv. dicoccum	1	20
Triticum x Agropyron	2	
Vicia faba	7	50
Vicia villosa	1	
Vitis vinifera	1	
Weigela sp.	1	20
Zea mays	11	2200

The 188 institutes maintaining the above listed collections are located as follows:

Europe (incl. USSR)	67
South East and Far East Asia	54
North America	36
Latin America	10
Africa	9
Near and Middle East	9
Australia	3
Total =	188

Economic value of some mutant varieties

	Crop/Variety	Year	Area 1000 ha	Yield t	Production 1000 t
CSSR	Barley total	1973	850	3,12	2651
	cv. Diamant		272	3,44	938
	Barley total	1974	871	3,40	2962
	cv. Diamant		261	3,59	938
	cv. Ametyst		73	4,21	309
DENMARK	Barley total	1974	1445	3,76	5432
	cv. Rupal		14	3,79	53
	Barley total	1975	1437	4,15	5967
	cv. Rupal		87	4,19	365
FRANCE	Rice total	1974	16		
	cv. Delta		8		
	Rice total	1975	15		
	cv. Delta		10		

From Monthly Bulletin of Agric. Economics and Statistics, FAO, Rome, 26 (1977) No. 12.

REFERENCES

cv. Diamant MBNL No. 7 and 10
cv. Rupal MBNL No. 7
cv. Ametyst MBNL No. 6 and 10
cv. Delta MBNL No. 5

LIST OF MUTANT VARIETIES

The Plant Breeding and Genetics Section of the Joint FAO/IAEA Division undertakes the collection and dissemination of information on commercially used agricultural and horticultural varieties developed through the utilisation of induced mutations. This list does not claim to be comprehensive. Its content is strictly based on information transmitted by the breeders themselves and/or other institutions involved. Listing of a variety does not imply its recommendation by FAO/IAEA.

Name of **new variety**	Place and date of release (or approval) and name of principal worker and institute	Kind and date of mutagenic treatment [parent variety] or mutant crosses (mutant underlined)	Main improved attributes of variety
<u>BARLEY</u>			
Fakel	1975 USSR E.D. Nettevich, A. Sergeev Scient. Research Institute of Agric. for Central Districts of Nonchernozem Zone, Nemchinovka Moscow District	EI 0,04% seeds 1966 [Moskovskii 121]	15-18% shorter straw lodging resistant higher protein content
Stange	1978 Norway S. Frogner Department of Farm Crops Agricultural University Ås, Norway	Ingrid x <u>Mari</u>	Short culm superior yield
<u>LUPINUS</u>			
Eregulla	1972 W. Australia J.S. Gladstones Department of Agriculture	Complex crossing of mutants [Chapman]	Low alkaloid, early flowering, while flowers and seeds (non-shattering)

Name of new variety	Place and date of release (or approval) and name of principal worker and institute	Kind and date of mutagenic treatment [parent variety] or mutant crosses (mutant underlined)	Main improved attributes of variety
PEA			
Moskovsky 73	1974 USSR G.A. Debeliy and O.I. Bezhanidze Agric. Inst. Central Regions of Nonchernozem Zone Nemchinovka, Moscow Region	DES, 0.03% 1967 [Nemchinovsky 766]	Larger grain, higher protein content
GROUNDNUT			
TG 3	1973 New Delhi (India) S.H. Patil Biology and Agriculture Division BARC Trombay	15kR X-rays 1958 [Spanish Improved]	More pods per plant higher yield, esp. under rainfed conditions
TG 4	1976 Andra Pradesh, Maharashtra (India) S.H. Patil Biology and Agriculture Division BARC Trombay	15rK X-rays, 1958 [Spanish Improved] Intercross of mutants	Uniform maturity higher yield esp. in irrigated conditions
TG 17	1977 Gujarat (India) S.H. Patil Biology and Agriculture Division BARC Trombay	15kR X-rays, 1958 [Spanish Improved] Intercross of mutants	Higher yield short plants without secondary branching, higher harvest index

Name of new variety	Place and date of release (or approved) and name of principal worker and institute	Kind and date of mutagenic treatment [parent variety] or mutant crosses (mutant underlined)	Main improved attributes of variety
PEPPER			
Krichimsky ran	1972 Bulgaria S. Daskaloff, L. Milkova Inst. Genetics and Plant Breeding Sofia	X-ray dry seeds 1965, [Pasardjishka kapia] mutant 794 ms$_3$ source of male sterility for line 215 ms$_3$, the female parent for the hybrid variety	Hybrid variety, high yield, early, improved fruit quality
JUTE			
Atompat-28 (C-28)	1974 Bangladesh M.M. Mia, M.A.Q. Shaikh, C.S. Seha A.D. Bhuiya Inst. of Nuclear Agriculture Mymensingh	Seeds γ- rays 1964 [D-154]	Higher yield
Atompat-36 (C-36)	"	Seeds γ- rays 1964 [D-154]	Higher fibre yield, slightly later maturity more resistant to stem rot (Macrophomina phaseoli)
Atompat-38 (C-38)	"	Seeds γ- rays 1964 [D-154]	Vigorous, more leafy, higher yield
Shwe Gon Tun	1975 Burma M.S. Haq IAEA Expert, Agric. Research Institute Gyogon	Selection from mutant C$_{28}$ developed in Bangladesh	Early maturing, high yield

RICE			
Shwe War Tun	1975 Burma Tin Myint, Khin Win, Agric. Research Institute Gyogon M.S. Haq IAEA Expert	25kR γ-rays, seeds 1971 [IR5]	Improved grain quality, higher yield, slightly earlier and taller 1975 15000 ha cultivation
SUGARCANE			
Co 997 mutant	1967 India J.T. Rao, K.V. Sreenivasan Sugarcane Breeding Institute Coimbatore	Buds, γ-rays [Co 997]	Resistant to red rot
Co 6608	1966 India J.T. Rao, K.V. Sreenivasan Sugarcane Breeding Institute Coimbatore	Buds, γ-rays [Co 449]	Resistant to red rot
BEGONIA			
Northern Sunset	1975 Canada J.M. Molnar Ornamentals Research Service Agric. Canada Ottawa, Canada	X-rays [Renaissance]	Increased no. of petals per flower
HIBISCUS			
Hiroshima local No. 1 No. 3 No. 5 No. 8	1967 Yanahara Distr. H. Kuwada Faculty of Agriculture Kagawa University Japan	0,5kr γ-rays 1956 [Hiroshima local]	Increased plant height, resistance to *Phytophthora parasitica*

NOTE: Readers are kindly requested to report to us any information about commercial mutant varieties including varieties which have induced mutants in their pedigree. Of particular interest is information about the commercial value of such varieties (acreage covered, amount of certified seeds produced, date of withdrawal from commercial production).

RECENT PUBLICATIONS

The Application of Mutation Breeding Methods in the Improvement of Vegetatively Propagated Crops by C. Broertjes and A.M. van Harten, Elsevier, Amsterdam 1978, US$57.

(Authors list 146 cultivars of fruits, vegetables and ornamentals developed by mutation induction and describe the appropriate methods for success in mutation breeding of vegetatively propagated plants).

FELLOWSHIP TRAINING 1976/77

M.A. Awan (Pakistan) - Pullman, Washington (USA)
C.S. Saha (Bangladesh) - Ohmiya (Japan)
E. Gacek (Poland) - Casaccia (Italy)
A. Baradjanagara (Indonesia) - Seibersdorf (Austria)
A. Shakoor (Pakistan) - Netherlands, Sweden, Denmark, Italy, Spain, Nigeria
A. Tulman-Neto (Brazil) - Weibullsholm (Sweden).
K. Samphantharak (Thailand) - Oak Ridge (USA)
M. Tomaszewski (Poland) - Philadelphia (USA)
M.A.Q. Shaikh (Bangladesh) - Svalöv (Sweden)
B. Rangelov (Bulgaria) - Skierniewice (Poland)
N.I. Hashmi (Pakistan) - Pullman, Washington (USA)

EXPERTS & CONSULTANTS 1976/77

S. Blixt (Sweden) - Vienna (Austria)
S. Blixt (Sweden) - Piracicaba (Brazil)
H. Brunner (IAEA) - Bandung (Indonesia)
H. Gaul (FRG) - Kuala Lumpur (Malaysia)
S. Haq (Bangladesh) - Maracaibo (Venezuela)
A.K. Kaul (India) - Mymensingh (Bangladesh)
E.I. Kivi (Finland) - Tuwaitha (Iraq)
K. Mikaelsen (IAEA) - Jakarta (Indonesia)
K. Mikaelsen (IAEA) - Faisalabad (Pakistan)
R. Rabson (USA) - Vienna (Austria)
G.S. Ryan (Argentina) - Kinshasa (Zaire)
B. Sigurbjörnsson (Iceland) - Vienna (Austria)
F. Walther (FRG) - Faisalabad (Pakistan)

FUTURE EVENTS

1978

Regional FAO/IAEA Seminar on the Utilization of Induced Mutations for Crop Improvement in Africa, 23-27 October, IITA Ibadan (Nigeria)

FAO/IAEA Study Tour on the Application of Nuclear Methods in Agriculture, 9-22 October, USSR.

1979

EUCARPIA - Meeting on Breeding for Adaptation to Low Energy Conditions (light, temperature) of Glasshouse and Field Crops, Wageningen, The Netherlands, 6-8 February.
Contact: L. Smeets, I.V.T., P.O. Box 16, Wageningen, The Netherlands

Plant Breeding Symposium II at Iowa State University (USA) 12-16 March.
Contact: K.J. Frey, Agronomy Department, Iowa State University, Ames, Iowa 50011.

World Soybean Conference II, 26-29 March 1979, Raleigh, N.C. (USA)
Contact: B.E. Caldwell, North Carolina State University, P.O. Box 5155, Raleigh, N.C. 27650.

9th International Course on Applied Plant Breeding, Wageningen, The Netherlands, 27 March - 29 June.
Contact: International Agriculture Centre, Wageningen, The Netherlands

14th Pacific Science Congress, Academy of Sciences of the USSR, Novosibirsk (USSR), August 1979.
Contact: Prof. A.P. Kapitsa, President of Far East Research Centre, Academy of Sciences of USSR, 50 Leninskaya Street, Vladivostok, USSR.

5th Symposium on Tropical Root Crops, Cebu City (Philippines).
Contact: M.R. Villanueva, National Root Crops Research Centre, Baybay, Leyte 7127, Philippines.

LAST BUT NOT LEAST

Please submit your contributions to the Newsletter by 1 June and 1 December of each year.

Authors are kindly requested to take into account that the readers want to learn about new findings and new methods but would also like to see the most relevant data on which statements and conclusions are based. Conclusions should be precise and distinguish facts from speculation. The length of contributions should not exceed 2-3 typewritten pages including tables. We regret that photographs cannot be accepted for technical reasons. References to publications containing a more detailed description of methods or evaluation of findings, are welcome but should generally be limited to one or two.

Alexander Micke
Richard D. Brock
Leila Shawa

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