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Mutation Breeding Newsletter

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RESEARCH NEWS

Seedless induced mutant in lemon (Citrus limon)

Radiation has been used sporadically for obtaining useful mutants Citrus [1,2,3].

Lemon cv. Eureka is practically seedless to few seeded in solid block plantings. Under conditions prevailing in most Israeli groves seed content usually varies between 6-15 seeds per fruit. In our variety collection at Bet Dagan seed content tends to be high.

Budwood of Eureka lemon was exposed to gamma rays from a Co source at 2,4 and 6 krad. Buds from mV_1 plants (usually buds 3 to 15) were individually budded onto Sour orange rootstocks in the nursery, along with buds from non-irradiated material. Out of 600 mV_2 plants grown in the field at 4 x 2m spacing several trees bore seedless or few seeded fruit. One completely seedless selection from the budwood irradiated by 6 krad (tree 20/7) was made. Fruit on the selected tree was observed for 4 consecutive seasons and proved to be consistently seedless. mV_3 trees from budwood of the selected original tree have been raised and these also bear seedless fruit, in a highly mixed planting with very efficient pollen donors. Propagation of the Eureka selection has been started.

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..33/30

[3] SPIEGEL-ROY, P. and PADOVA, R. Radiosensitivity of Shamouti orange (Citrus sinensis) seeds and buds. Radiation Botany 13(2) (1973) 105-110.

(Contributed by S. Spiegel-Roy, Aliza Vardi and A. Elhanati, Department of Fruit Breeding and Genetics, The Volcani Center, A.R.O. Bet Dagan, Israel).

Details regarding the origin and the characteristics of the groundnut mutant variety "Co.2" (Mutant 3)

POL-1 was released in Tamil Nadu in the year 1968. It is a pureline selection from a Malaysian variety. This variety possesses about 15% triple seeded pods besides single and double seeded pods. The kernel is bold and plumpy. The variety was treated with EMS at different doses in order to increase the spectrum of genetic variability for selection of mutants with higher yield and higher shelling percentage.

'Mutant 3' produces 1 to 3 basal secondary branches in 15-20% of the plants contributing to increased number of pods. The original genotype possesses four primary branches only. The mutant has mostly two seeded pods besides one seeded pods. The mutant is tolerant to "Tikka" leaf disease and is less susceptible to rust. The shelling outturn is higher. The pod maturity is uniform with basal setting. Mutant-3 gave a mean increase in yield of 18.3 and 13.2 percent under rainfed and irrigated conditions over POL.1, the original genotype. It was released in 1984 as "Co.2" groundnut.

The higher pod yield in the mutant variety is due to higher number of pods per plant and higher shelling percentage. There is not much difference in grain size and grain quality to the original genotype POL-1. However, the weight of 100 kernels is higher than in other varieties: 41, 34 and 37 g respectively iin the Mutant-3, Co.1 and TMV.12.

(Contributed by M.R. Sivaram, R. Rathnasamy, R. Appdurai, Agricultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore 641 003, India).

"Zhe Fu 802", a new mutant rice variety

The variety has been developed by gamma irradiation of dry seeds of cv. Se Mai 2 at the Zhejiang Agricultural University in co-operation with an agricultural research station in Yu-Mong county.

The main characteristics are as follows:

1) The growing period of the variety is about 112 days, 3 days earlier than a medium maturity control variety and 2 days later than an early maturity control variety.

2) The average yield is about 6400 kg/ha, the highest yield obtained 9000 kg/ha. In trials its yield was 6.4% higher than that of the medium maturity control and 17.4% higher than that of the early control variety.

3) The variety was shown in artificial inoculation tests to be resistant to rice blast races A_1, B_{15}, C_1, C_{13}, D_1, D_3, E_1, E_3, F_1, G_1, A_{61} and B_1.

4) The crude protein content in the brown rice is about 14%.

Productivity tests of the variety "Zhe Fu 802" during 1981 showed that its high yield capacity results mainly from larger panicles, more grains per panicle and higher seed setting percentage. The rice plants grow well in poor soil and are tolerant to temperature stress. The variety has been grown in many provinces in South China. Its cultivation area covered 20,000 ha in 1983, 220,000 ha in 1984 and more than 710,000 ha in 1985. The production area ranks second among mutant rice varieties released in China.

REFERENCE

Mutation Breeding Newsletter 25 (1985) p. 15.
(Contributed by Hsia Yin-Wu, Nuclear Agricultural Institute, Zhejiang Agricultural University, Hangzhou, China).

A leaf rust resistant mutant of wheat cultivar WH 147

A mutant with improved resitance to wheat leaf rust caused by *Puccinia recondita* Rob. ex. Desm.f.sp. *tritici* was obtained in the high yielding wheat cultivar WH 147.

This leaf rust resistant mutant was isolated out of 2549 M_2 seedlings screened in a growth chamber and then transplanted to the field to obtain M_3 seeds. Subsequently, 43 M_3 plants were raised, harvested and carried to M_4. Their performance was compared with the parent cultivar WH 147. Maximum leaf rust intensity, grain colour, grain size, glume colour, ear characters (awning, and ear shape) and single plant yield was recorded.

Lines 2460-2, 2460-2, 2460-16, 2460-18, 2460-19, 2460-22 and 2460-23 were most promising ones. These resistant families have maintained all the characteristics of the parent cultivar except a slight change in the ear shape, but they show a 10% reduced yield.

(Contributed by D.L. Sharma, A.K. Gupta, R.G. Saini and Madhu Verma, Department of Genetics, Punjab Agricultural University, Ludhiana, India).

Mutations for early maturity in pearl millet

Tift 23B pearl millet, *Pennisetum americanum* (L.) Leeke, seed treated with ethyl methane sulfonate and thermal neutrons resulted in the e_1 and e_2 early mutations, respectively. Both mutants are controlled by single recessive genes. Plants with the e_1e_1 genotype or the e_2e_2 genotype flowered in 49 and 38 days, respectively after planting on 12 June compared to 76 days for Tift 23B. Both mutants had significantly shorter plant height, shorter heads, and thinner stems than Tift 23B. Significant differences were observed between Tift 23B and the e_1 or e_2 mutants for flag leaf length, peduncle length, internode length, and internode number.

The e_1 mutant was associated with no detectable undesirable characteristics and could be readily used to develop new early maturing cultivars. The e_2 mutant has a weak spindly appearance and would require backcrossing and selection to eliminate undesirable characteristics.

The e_1 gene was used to develop early maturing cytoplasmic male sterile inbred 'Tift $23A_1E_1$' and its fertile maintainer line 'Tift $23B_1E_1$'. These inbreds are 1.4 m tall and flower in 45-50 days after planting. They have all of the desirable agronomic traits and excellent combining ability of

Tift 23. Tift $23A_1E_1$ should make an excellent female parent for producing 1.5-2.5 m tall grain hybrids when crossed with selected male lines of similar height and maturity.

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(Contributed by Wayne W. Hanna and Glenn W. Burton, USDA/ARS, Coastal Plain Experiment Station, Tifton, Georgia 31793, USA).

BL-22 - a late flowering and high yielding mutant of Egyptian clover (*Trifolium alexandrinum* L.)

Egyptian clover is a multicut winter legume which supplies nutritious and palatable green fodder for a long period. During the summer months of May and June, there is general scarcity of green fodder which adversely affects the milk production. The Egyptian clover variety 'Mescavi' which is early ripening matures by the first fortnight of May. A mutation breeding programme was thus started to obtain late flowering mutants which could supply green fodder during these months. Seeds of 'Mescavi' variety were irradiated with gamma rays. A late flowering mutant BL-22 isolated from 40 kR treatment has shown promise. It is quick growing and attains more height than 'Mescavi'. It has more leaflets with increased size. Due to late flowering, this mutant gives additional cuttings of green fodder during the scarcity period.

Yield performance

BL-22 has been tested in the trials conducted by the All India Co-ordinated Research Project on Forage Crops along with the parent variety and the standard check (S-99-1) at different locations throughout India and the results are presented in Table 1.

Table 1. Relative performance in the All India Co-ordinated Trials

Year	No. of locations	BL-22	Rank	Mescavi	Rank	S-99-1	Rank
i) Green fodder yield (q/ha)							
1982-83	11	723.9	I	594.1	XIII	650.5	X
1983-84	14	502.2	II	462.6	VIII	449.6	IX
ii) Dry matter yield (q/ha)							
1982-83	7	71.25	I	67.78	VI	62.06	X
1983-84	13	74.24	I	61.81	X	66.09	VII

On the basis of two years data, BL-22 has outyielded 'Mescavi' and 'S-99-1' by 16.0 and 11.5% respectively in green fodder yield. Similarly, in dry matter yield, it excelled 'Mescavi' by 10.7% and 'S-99-1' by 11.9%.

Performance in Temperate Zone

The variety BL-22 has been tested at Palampur in the temperate zone for the last three years. The data are presented in Table 2.

Table 2. Performance in temperate zone (mean of three years)

Variety	Green fodder yield (q/ha)	Dry matter yield (q/ha)	Crude protein yield (q/ha)
BL-22	623.6	99.1	19.54
Mescavi	529.2	81.9	16.55
S-99-1	472.1	73.6	14.98
% increase			
over Mescavi	17.8	21.0	18.4
over S-99-1	32.1	34.6	30.8

Based on its performance BL-22 has been recommended for release in the temperate zone by the X Annual Workshop of the All India Co-ordinated Research Project on Forage Crops held at Jhansi from September 23-25, 1984.

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(Contributed by M.S. Sohoo, S.M. Beri and B.L. Bhardwaj, Forage Research Unit, Department of Animal Science, Punjab Agricultural University, Ludhiana, India).

Soybean mutation breeding in the German Democratic Republic

Adaptation to cool climatic conditions connected with earliness and fitness for mechanized harvesting are essential breeding aims for soybeans in Northern European countries. Seeds from the early Swedish variety 'Fiskeby V' were treated with N-nitroso-N-methylurea, sodium azide or gamma-rays, respectively, for induction and selection of long stem mutants with higher insertion of the lowest pods. In M_2, types appeared with shorter as well as with longer stems, and insignificant change of vegetation time. 68 of 317 long stem types selected in M_2 bred true in the next generation (21.4%). The mutation frequency (number of confirmed mutations per 100 M_2 progenies) amounted to 0.76% for this character (Table 1). Results of the M_4-M_5 cultivation of some of these mutants are summarized in Table 2 [3]. Experiences of the years of 1982 and 1983, with best climatic conditions for soybean growing, and the considerable cooler summer in 1984 have shown that the mutants, in general are more stable in their yielding capacity than later ripening foreign varieties.

In previous experiments we have studied the probability of recovering mutants dependent on the size of M_2 progenies as well as on the chimerical character of the M_1 plants [1] and found N-nitroso N-methylurea considerably more effective than sodium azide for mutation induction in soybean [2].

Table 1. Mutagen treatments and frequencies of long stem mutants in M_2 and M_3 generations

	Control	Exp. I 1979	Exp. II 1980	Exp. III 1981
M_1 generation				
Mutagen		NMH	NMH	γ-rays
Conc. or dose	0	0.1-1 mM	0.5-2 mM	5-11 krad
Number of seeds	14000	30000	15000	15000
M_2 generation				
Plant progenies analysed	1742	5127	1248	2520
Plant progenies with long stem plants	24	261	14	42
M_3 generation				
Confirmed long stem mutants	0	41	7	20
Mutation frequency (%)	0	0.80	0.56	0.79

Table 2. Morphological characters, vegetation period, and yield of mutants with longer stems (mean of M_4/1982 and M_5/1983)

Mutant/ variety	Plant height (cm)	Insertion of the lowest pod (cm)	Days from emergence to maturity	1000 grain wt. (g)	Grain yield kg/day/ha	Grain yield total kg/ha	rel.
'Fiskeby V'	44	8.8	105	155	15.9	1670	100
M. 14	52	12.3	113	142	14.2	1600	96
M. 22	66^x	11.0	116	153	17.6	2040^x	122
M. 30	59	18.4^x	110	145	16.8	1850	111
M. 32	62	11.7	113	150	16.0	1800	108
M. 37	56^x	12.0	112	154	15.0	1690	102
M. 43	55	13.6	110	156	16.4	1810	108
M. 53	68^x	12.2	118	159	17.5	2080^x	124
M. 62	56	13.6	111	144	15.2	1690	101
M. 63	58	15.0^x	114	146	14.6	1660	99
M. 66	61^x	18.8^x	113	142	16.2	1920	115
M. 75	56	12.6	113	165	16.0	1910	114
M. 78	57	12.2	111	171	15.4	1710	102
M. 79	57	13.0	112	159	15.6	1740	104

^{x}In 1983: difference to 'Fiskeby V' significant at P = 0.05

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(Contributed by G.W. Krausse, Institute for Breeding Research of the Academy of Agricultural Sciences, Dept. Dornburg, DDR-6904 Dornburg, German Democratic Republic).

Induced mutant for jassid resistance in cotton

At the Central Institute for Cotton Research, Regional Station Coimbatore, an induced mutation project was initiated in 1978. The cotton variety C.1412 is a short duration one (140 days) with compact plant habit and daylength-tolerance, capable of spinning 30 count. But it is susceptible to jassid pest attack. We sought to obtain hairiness through induced mutation to confer tolerance to jassid.

Seeds of this variety were subjected to gamma rays from 10 to 30 kR. In another project, flowers of the parent variety were emasculated and dusted with pollen grains irradiated with 0.5 kR gamma rays.

In 1980 in the M_2, in one of the progenies of pollen irradiated lines, three hairy plants were found. The leaves were thickly hairy and had a tough lamina. But they also exhibited some undesirable traits like early boll shedding and drying. To get over some of the defects, these mutants were crossed with the original parent variety C.1412, using the mutant as the male parent.

The selections from the cross have reached the sixth generation and some were tested in replicated row yield trials. The mutant cross derived lines have yielded 7 to 30 per cent more seed cotton than the parent check. Besides, they are equal to the parent in attributes like daylength-tolerance, compact plant type with short fruiting branches, lint quality and ginning outturn. They exhibited good tolerance to jassid attack with injury grade I (most tolerant) while the parent variety recorded grade IV (highly susceptible). These mutants will be tested in various locations under the All India Co-ordinated Cotton Improvement Project to judge their performance under different agro-climatic conditions.

(Contributed by Dr. Premsekar, Central Institute for Cotton Research, Regional Station Coimbatore 641003, India).

Utilization of experimental mutagenesis in wheat breeding

Studies on mutation induction with physical and chemical agents are conducted since more than 20 years at the Institute of Wheat and Sunflower near General Toshevo, Bulgaria. The aim of this research is to use mutants in wheat breeding.

Mutated changes obtained as a result of the work till now concern almost all properties of wheat, both morphological and physiological ones like length and thickness of the straw; flowering time; weight of grain; length and form of the leaves and their disposition to the stem; ear form and thickness; duration of vegetation period; protein quantity and quality; winter and cold tolerance; resistance to diseases; productivity.

24 different types of mutants were obtained, three of which appear unknown till now:

(a) a form with typical shortening of the last but one internode, by 50%. The plants are 44 cm shorter than the initial variety Mironovskaya 808.
(b) female sterility with normal pollen productivity. The sterility is due to a degeneration of the female generative organs.
(c) a new gene, which determines the ear disposition in a sphaerococcum form with a loose ear and a high cold resistance.

We also observed a surprisingly high rate of chlorophyll mutations in hexaploid wheat, namely 1.74%. Some mutants forms are very important for breeding. A lot of the short-stem forms have the characteristics required for good donors of short-stem: A similar productivity as the initial varieties, a higher resistance to lodging, and a good combining ability. The height is intermediately inherited in the mutant forms M 169, M 1576, M 51/112, M 1658, M 20/127. Mutants M 50 and M 51 appear like three-gene dwarfs with a height of 30-35 cm, with a normal fertility and productivity of the ear but a dominant inheritance of the short-stem.

In relation to grain protein quality and quantity, a wide amplitude of variation was established with a high heritability, which indicates the possibility of effective selection. The mutants M 524, M 687, M 688 possess very good characteristics as donors for cross breeding. They contain from 17 to 19% protein, a sedimentation value from 56 to 64 and a bread volume from 540 to 567 cm^3.

In selection of disease resistant mutants, resistance was obtained significantly more often to brown, stem and leaf rust, individually or in combination, than to powdery mildew. A high complex resistance to brown, stem and leaf rust show the lines M 1870, M 773, M 329. Improved mutants are used in cross breeding.

5-6 mutant lines are submitted every year for testing as candidate varieties. Usually they exceed in productivity the standard by 2-3%, however, this is not sufficient for licence. The work continues and includes combinations between mutant lines for obtaining practical results.

(Contributed by K. Djelepov, Institute for Wheat and Sunflower, Gen. Toshevo, Bulgaria).

Early ripening winter barley mutant

A very early ripening winter barley mutant "54M17" has been obtained after seed treatment with nitroso-ethyl-urea (0.033% for 6 hours). The initial variety was Regia. The heading date of the mutant was 15-18 days earlier than that of the parental form. However, it was susceptible to mildew and had very poor winter hardiness. Therefore, it was crossed to the rather winter-hardy and mildew resistant mutant "52M1" induced by chemical mutagen nitroso-dimethyl-urea (0.05% for 6 hours) from variety "Vogelsanger Gold". The F_1 was crossed to the commercial variety "Lokus". Macromutants carrying valuable traits can lead in hybridization to a considerable transgressive variability. In this case, the use of the mutant "54M17" in crosses resulted in selection of lines 270/1, 270/3 with super-earliness and still good yield (Table).

Undoubtedly, the newly selected lines will be a valuable gene source for early harvest of winter barley varieties. This is very important to solve the urgent task of maize cultivation as a second crop on the same land.

Table: Characteristics of early ripening mutant lines of winter barley, Krasnodar, 1984

Genotype	Heading date	Lodging resistance (1-9)	Winter-hardiness (1-9)	Grain yield, kg/plot
Cyclone st.	May 12	6	4	2.7
54M17	April 22	5	2	1.6
52M1	May 9	6	6	2.5
Lokus	May 6	6	5	2.5
270/1	April 16	9	4	2.4
270/3	April 18	9	5	2.6
270/4	April 26	8	6	2.8
270/8	April 28	8	5	3.2
$LSD_{0.05}$				0.15

(Contributed by V.M. Shevtsov, Krasnodar Research Institute of Agriculture, 3500 Krasnodar, USSR).

Improvement of a local rice cultivar through induced mutation

In 1973 seeds of the local popular rice cultivar "Nizersail" were treated with gamma rays and EMS. Mut NS 1 was found to be of special interest because of its tallness, early maturity and higher grain yield (straw is required for feeding, therefore taller varieties are preferred by farmers). This mutant therefore was put to a multilocation on-farm trial during the Aman season (July-December) of 1984 at 13 locations in Bangladesh along with the parent and the best traditional variety of that locality. The mutant proved to be superior over the parent and the best local variety (see Table). The grain production per day was also higher in the mutant.

Multilocation on-farm trail with Mut NS 1 (Aman, 1984)*

Mutant strain/ Variety	Crop duration (days from trans-planting to maturity)	Plant height (cm)	Grain Yield** (kg/ha)	Grain production/day (kg/ha)
Mut NS 1	113	134.1	3727a	33.27
Nizersail (parent)	134	126.5	3124b	23.33
Best local (check)	118	127.8	3222b	27.36

*The data presented are of 13 locations average.
**Yield values with the same letters do not differ significantly at 5% level.

(Contributed by L. Hakim, M.A. Azam, A.J. Miah and M.A. Mansur, Bangladesh Institute of Nuclear Agriculture, P.O. Box 4, Mymensingh, Bangladesh).

Performance of gamma ray induced groundnut mutants in Sri Lanka

Mutation induction research with groundnut using ^{60}Co gamma radiation was initiated in 1980 at the Agriculture Research Institute, Angunakolapelessa, Sri Lanka. Two adapted cultivars Vietnam and GN 13 were irradiated with doses ranging from 5 krad to 45 krad [1]. Selections were carried out in the M_2 for combinations of yield components [2]. The three best mutants were included in the National Co-ordinated Groundnut Variety Evaluation Experiment since the North-East monsoon season of 1982/83. No. 45, a recently released cultivar served as the check.

The evaluation experiment was conducted in form of a Randomized Complete Block with four replications and twelve treatments at the Research Stations Angunakolapelessa, Maha-Illuppalama, Karadian-Aru, Kilinochchi, Mahiyangana, Moneragala and Makandura, all located in the dry and intermediate zones of the island where groundnut is widely grown.

Two mutants selected from 5 krad treated "GN 13" cultivar, viz. 180/21 and 180/22 consistently outyielded the recommended variety during three seasons (Table). The third mutant 980/30 was selected from 15 krad treated "Vietnam" cultivar. This mutant was 5% lower in yield than the recommended cultivar in the 1982/83 North-East monsoon season. However, in the two subsequent seasons it recorded a 32% and 7% higher mean yield than No. 45. This mutant is probably more suitable for the drier conditions of the South-West monsoon season, whereas 180/21 and 180/22 are more widely adapted. In addition to high yield potential, these mutants have better shelling percentage (particularly 180/21), larger kernel and more two-seeded pods than the recommended cultivars.

The evaluation of these mutants is being continued by the Sri Lanka Department of Agriculture.

Table: Performance of groundnut in multilocation trials

Mutant line or variety	Pods/ plant	100 KW g	Seeds/ pod	Shelling %	Yield, Kg/ha	Yield, % control
	North-East monsoon-1982-83		(Means of 6 locations)			
180/21	20	44	1.9	74.6	2111	125.4
180/22	26	46	1.8	70.2	2001	118.9
980/30	21	41	1.9	71.3	1597	94.9
No.45 (Check)	20	40	1.8	71.3	1683	100
	South-West monsoon-1983		(Means of 5 locations)			
180/21	21	48	1.8	70.7	1753	106.3
180/22	25	51	1.7	69.3	2162	131.2
980/30	21	50	1.8	70.8	2171	131.7
No.45 (Check)	22	46	1.7	69.5	1648	100
	North-East monsoon-1983/84		(Means of 6 locations)			
180/21	18	36	1.9	72.2	1223	123.2
180/22	19	35	1.8	69.3	1103	111.1
980/30	22	37	1.9	73.1	1067	107.5
No.45 (Check)	22	36	1.8	70.8	993	100

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(Contributed by R. Pathirana, Agriculture Research Institute, Angunakolapelessa, Sri Lanka. Present address: Department of Agronomy, Faculty of Agriculture, University of Ruhuna, Kamburupitiya, Sri Lanka).

The induction of mutations in apples

The vegetative propagation of fruit plants allows the use of somatic mutations. One can obtain improved recessively inherited characters in this way, such as compact growth or better colour.

Mature summer buds of the variety 'McIntosh' were treated in 1977 acutely with gamma rays (Co^{60}) with doses of 17 and 34 Gy and the intensities of 2.9×10^{-4} Gy/sec. or 5.8×10^{-4} Gy/sec. 19 clones with compact growth were selected in 1976, grafted on M 9, and planted in plots of 10 to 15 trees, spaced 4 x 2 m for testing for cropping and fruit characters. Using a 9 point scale, the yield of fruits, skin colour and fruit quality were evaluated (Table).

Table: Evaluation of cropping and fruit features of mutant clones of "McIntosh" on M 9 rootstock
All induced by 34 Gy gamma radiation
Scale: 1 (lowest) - 9 (best)

Clone	fruit load 1979-1983 (mean)	specific yields in kg/cm² of stem cross section	Stem cross section (cm²)	Fruit Characters			
				mean fruit weight (g)	skin colour spreading	taste	storeability (days)
128	5.1	0.618	7.55	142	6.9	7.7	158
177 E-7	5.2	0.497	10.74	121	6.5	7.5	142
177 I-4	5.8	0.626	13.45	135	6.6	7.5	158
177 N-4	5.5	0.556	10.52	127	6.8	7.5	158
177 O-7	5.6	0.445	11.27	120	6.9	7.5	158
Control (McIntosh Red)	5.4	0.441	16.28	131	5.1	7.5	150
McIntosh Spur E	5.1	0.456	15.59	140	6.3	7.5	142

In our "McIntosh" mutant evaluation the clones 177 I-4, 128, 177 N-4, 177 O-7 were the best. Mutants 128 and 177 E-7 showed a very upright compact growth of shoots and branches. They developed a stronger crown frame, but needed a careful pruning. With unsuitable heading the crowns got dense. Other mutants are intermediate between a compact and a normal growth type of "McIntosh". From the point of view of fruit characters all the clones are of more intensive colour. A longer storability show the clones 128, 177 I-4, 177 N-4 and 177 O-7.

After acute irradiation with the lower dose (17 Gy) only 3 mutant clones were selected. They showed a compact growth character, but none of them was notably improved in important pomological characters.

(Contributed by Paprstein, F., Blazek, J., Research Institute of Fruit Growing and Breeding, Holovousy, Czechoslovakia)

LIST OF VARIETIES

The Plant Breeding and Genetics Section of the Joint FAO/IAEA Division undertakes the selection and dissemination of information on commercially used agricultural and horticultural varieties developed through the utilization 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 attribute of variety
Arachis hypogaea L. (groundnut)			
Co 2	India, 1984 M.R. Sivaram S.R. Sree Rangasamy R. Appadurai Tamil Nadu University Coimbatore 641 003	soaked seeds 0.2% EMS [Pol-1]	high yield
Chrysanthemum sp.			
Cosmonaut	India, 1984? S.K. Datta M.N. Gupta National Bot.Res. Institute Lucknow	rooted cuttings 1.5-2.5 krad gamma rays 1980 [Nimrod]	anemone type flowers instead of single Korean type
Cicer arietinum L. (chickpea)			
Kiran (RSG-2)	India, 1984 C.P. Bhatnagar D.K. Saxena S.M. Bhatnagar Sukhadia University Agric.Res.Station Dura Durgapura, Jaipur 302015	seed, neutrons $4.5 \times 10^{12} n/cm^2$ [RS-10]	erect habit with increased no. of pods/ plant, early maturity, high yield. Salinity tolerance

Glycine max.(L) Merr (soybean)			
16 Aida (HM-S-78)	CSSR, 1984 Z. Hruby B. Zdrahalova B. Hradil Research and Breeding Institute of Technical Crops and Legumes Sumperk-Temenice Plant Breeding Station of Legumes Horní Mostenice	seeds EMS 1974 [Smena]	18 days earlier than Dunajka (140 days) yield ca. 2.2 t/ha stem type
17 Bangsa-Kong (CB27-25-27)	Rep. of Korea, 1985 S.H. Kwon H.S. Song J.H. Oh KAERI Seoul	seeds X-ray 25 kR [CB-27]	due to higher no. of pods high seed yield 2.5 t/ha smaller seed to fit soybean sprout, resistance to SMV-N
Hordeum vulgare L. (barley)			
RD-103	India, 1978 V.K. Bhatnagar, R.C. Sharma R.P. Chandola Sukhadia Univeristy Agric.Res. Station Durgapura, Jaipur 302015	RDB-1 x K-18	dwarf type, erect leaves, high tillering from RDB-1 high yield under irrigat-ion conditions
Rajkiran (RD-387)	India, 1982 D.K. Handa, V.K. Bhatnagar, R.C. Sharma, B.N. Mathur K.S. Nathawat Sukhadia University Agric.Res. Station Durgapura, Jaipur 302015	RDB-1 x Marocaine-079 (CI-8334)	dwarf type, erect leaves high tillering from RDB-1 nematode resistant

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 attribute of variety
Pisum sativum L. (pea)			
Milewska	Poland, 1983 J. Mikolajczyk J. Jaranowski ZDHAR Experiment Station Przebedowo	Gome x (Wasata x Biala)	better resistance to lodging due to afila-gene
Mihan	Poland, 1983 J. Mikolajczyk H. Strzykala ZDHAR Experiment Station Przebedowo	(Wasata x Biala) x Neugatersleben	better resistance to lodging due to afila-gene
Ramir	Poland, 1985 J. Styczynska St. Starzycki Inst.of Plant breeding and Acclimatization IHAR Radzikow	Sum (= Porta x Wasata) x Flavanda	better resistance to lodging due to afila-gene
Rosa hybrida (rose)			
Striped Christian Dior	India, 1975 USA, 1976 U.S. Kaicker V. Swarup IARI Div.of Floriculture New Delhi	dormant buds, gamma rays 7.5 kR (1970) [Christian Dior]	white and pink streaked petals on deep pink to red base
Abhisarika H.T.	India, 1975 USA, 1976 U.S. Kaicker V. Swarup IARI Div.of Floriculture New Delhi	buds, gamma rays 7.5 kR 1971 [Kiss of Fire]	pink stripes on a lemon yellow coloured base of petals

Pusa Christina	India, 1975 USA, 1976 U.S. Kaicker V. Swarup IARI Div.of Floriculture New Delhi	buds, 10 kR gamma rays 1970 [Christian Dior]	more attractive flowers pink, globular bud, vigorous
Trifolium alexandrinum L. (Egyptian clover)			
BL-22	India, 1984 M.S. Sohoo S.M. Beri B.L. Bhardwaj Forage Research Unit Dept.of Animal Science Punjab Agric.Univ. Ludhiana	seeds, 40 kR gamma rays [Mescavi]	later flowering, quick growing, 10% higher dry matter yield
Triticum aestivum (wheat)			
BR4	Brazil, 1979 IPEAS Pelotas CNPT Passo Fundo UFPEL Pelotas	IAS 20*3/Sinvalocho gama 1964-68	yield, stem rust re- sistance
Triticum turgidum ssp. durum (durum wheat)			
Signadur	Austria, 1984 H. Hänsel Probstdorfer Saatzucht Wien	CpB132 x Pandur (and vice versa)	short straw like CpB132, resistance against stem rust, partial mildew resistance, high yield

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Corrections ref. Mutation Breeding Newsletter No. 23, pages 19-20 and Mutation Breeding Review No. 3, page 73.

The following cultivars belong to Chrysanthemum sp. not Rosa sp.:

Golden Geos
Dark Mario
Orange Mario

New Publications

Mutation Breeding for Disease Resistance Using In-Vitro Culture Techniques.
Report of an FAO/IAEA Advisory Group Meeting
IAEA-TEC-DOC-342, 1985 42 pp.

Mutation Breeding Review No. 3:
Plant cultivars derived from mutation induction or the use of induced mutants in cross breeding, IAEA May 1985 92 pp.

Breeding of Varieties by Use of Radiations
Gamma Field Symposia No. 21, 1982
Induced Mutants as Genetic Resources
Gamma Field Symposia No. 22, 1983
Institute of Radiation Breeding NIAR-MAFF
Ohmiya-machi, Ibaraki-ken, Japan.

Breeding Legumes for Enhanced Symbiotic Nitrogen Fixation
G. Hardarson and T.A. Lie (edit.)
Proceedings of an FAO/IAEA Consultants Meeting
Martinus Nijhoff/Dr. W. Junk Publishers
Dordrecht (Netherlands) 1984 176 pp.
(also published in "Plant and Soil" Vol. 82, No.3 (1984)

Progress in Plant Breeding (G.E. Russell, edit.)
Content:
Dwarfing genes in wheat (M.D. Gale and S. Youssafian)
Sugar beet breeding in the U.S (R.J. Hecker and R.H. Helmerick)
Genetic improvement of protein grain crops (W. Williams)
Cassava breeding (D.C. Jennings and C.H. Hersbey)
Breeding programme at CIP (H.A. Nedoza and R.L. Sawyer)
Oil palm breeding (J.J. Hardon, Vi Rav, N. Rajanaidu)
Drought response in cereals (R.E. Sojka)
Bird resistance in sorghum and maize (R.W. Bullard and S.O. York)
Breeding chickpeas at ICRISAT (J.B. Smithson)
Breeding rice for disease resistance (G.S. Kush and S.S. Virmani)
Genetic resources in vegetables (P. Crisp and D. Astley)

Butterworths London 1984, 325 pp.

Crop breeding, a contemporary basis (P.B. Vose and S.G. Blixt, edit.)
Content:
Selection criteria (S.K. Sinha and M.S. Swaminathan)
Breeding for disease resistance (R.R. Nelson)
Useful physiol. and biochem. traits in maize (J.H. Sherrard et. al)
Nutritional requirements of plants (P. Vose)
Resistance to low temperature (C. Stushnoff et. al)
Drought resistance (J.M. Clarke and T.F. Townley-Smith)
Photosynthesis and assimilate partitioning (P. Apel)
Biological nitrogen fixation (J.M. Vincent)
Induced mutations (C.F. Konzak)
Computers for genebanks and breeders (S. Blixt)

Plant tissue culture: Propagation, mutations, protoplast techniques (M. Cailloux)
Haploids (W.R. Sharp, S.M. Reed, D.A. Evans)
Protein (H.P. Müller)
Tissue culture: Disease elimination and germ plasm storage (G.G. Henshaw)
Ideotype, a moving target (S. Blixt and P.B. Vose)

Pergamon Press Oxford 1984, 443 pp.

Mutation breeders will of course be particularly interested in the review by C.F. Konzak, which covers on 76 papges with 447 references relevant methodological aspects as well as useful results. However, all the other chapters provide for inspiring reading.

FUTURE EVENTS

1986

FAO/IAEA International Training Course on the Induction and Use of Mutations in Plant Breeding
FAO/IAEA Agricultural Biotechnology Unit, Seibersdorf Laboratory, Austria
8 April - 16 May
Contact: Dr. T. Hermelin
IAEA, P.O. Box 100
A-1400 Vienna, Austria

First Arab Scientific Conference for Horticulture
Amman, Jordan
12 - 17 April
Contact: Dr. Hassan Fahmi Jumah
Director General
Arab Organization for Agricultural Development
P.O. Box 474
Khartoum, Sudan

11th EUCARPIA Congress "Quality in Plant Breeding"
Warsaw, Poland
22 - 29 June
Congress Secretariat: IHAR-ZK, Radzikow
P.O. Box 1019
PL-00-950 Warsaw

Conference on Biology of the Leguminosae
Missouri Botanical Garden
23 - 27 June
Contact: Dr. James L. Zarucchi
Missouri Botanical Garden
P.O. Box 299
St. Louis, Missouri, USA

International Food Legume Research Conference
Spokane, Wash. 99220, USA
6 - 11 July
Contact: Dr. R.H. Lockerman
Plant and Soil Science Department
Montana State University
Bozeman, Montana 59717, USA

22nd International Horticultural Congress
University of California, Davis, USA
11 - 20 August
Congress Secretariat: Campus Events and Information Office
University of California
Davis, CA 956 16, USA

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WERE ORIGINALLY BLANK

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