Mutation Breeding Newsletter

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Report from the Plant Breeding and Genetics Section of the Joint FAO/IAEA Division

The year 1984 saw the 20th Anniversary of the Joint FAO/IAEA Division and its official celebration in the presence of FAO Director General, Dr. E. Saouma, at the IAEA General Conference in October. A scientific seminar and an exhibition demonstrated to the delegates some of the technology achievements derived from the joint programme between FAO, IAEA and their Member States.

Most relevant for the future will be the establishment of in-vitro culture facilities at the FAO/IAEA Agricultural Biotechnology Laboratory Seibersdorf. They have already been in use for the 3rd FAO/IAEA Interregional Training Course on the Induction and Use of Mutations in Plant Breeding, 3 April - 18 May 1984. 20 trainees, all from different countries were trained. In addition to training in mutation induction the laboratory can now offer training in in-vitro culture of maize, garlic, alfalfa, pea, banana, cassava and cocoa.

3 - 7 March 1984 research contract and agreement holders of the FAO/IAEA Co-ordinated Research Programmes on the Use of Induced Mutations for Improvement of Grain Legume Production in South East Asia (RCA) and on Induced Mutations for Disease Resistance in Grain Legumes met jointly at the Nuclear Institute for Agriculture and Biology, Faisalabad, Pakistan for their 4th research co-ordination meeting.

Participants in the FAO/IAEA Co-ordinated Research Programme on "Evaluation of semi-dwarf cereal mutants for cross breeding" met 2 - 6 April at CIMMYT (Mexico) to review results obtained during the last two years. Good progress has been made in identifying new sources of dwarfing genes and in evaluating such genes in various genetic backgrounds or environmental conditions. For the start of work under a newly established co-ordinated research programme on "Improvement of root and tuber crops and similar vegetatively propagated crop plants in tropical countries by induced mutations", the first research co-ordination meeting was held 17 - 21 December at Pattya (Thailand). In-vitro cultures are going to play a major role in this new programme.

Under the frame of the IAEA Technical Co-operation Programme, projects have been serviced in Brazil, Ghana, Indonesia, Malaysia, Mongolia, Panama, Peru, Venezuela, Yugoslavia, Zambia.

In the meantime, final preparations for the International Symposium on Nuclear Techniques and In-Vitro Culture for Plant Improvement, to be held in Vienna, 19 - 23 August 1985 have begun. Unfortunately, due to lack of funds, the in-vitro culture training course originally planned in conjunction with the symposium had to be cancelled.

RESEARCH NEWS

Non-nodulating and non-fixing mutants of pea

Pea mutants unable to fix atmospheric nitrogen in symbiosis with rhizobium are valuable for characterization of plant genes involved in nitrogen fixation. They would also be useful in physiological research, although probably not in plant breeding.

Induction of non-nodulating, non-fixing and nitrate resistant nodulation mutants is now investigated in several laboratories [1-3].

'Finale', a low white flowered, strongly determinate cultivar with large round green seeds was chosen. It is grown in many European countries and known for stable yields. The major disadvantage of 'Finale' is a rather low seed production.

Lots of 1.5 kg (about 4500 seeds) were (a) soaked in 0.1% EMS overnight or (b) presoaked in water overnight and treated with 0.5% EMS for one hour or (c) presoaked in water overnight and treated with 0.5% EMS for two hours. The wet seeds were treated with captan fungicide and sown in the field. One pod per plant was harvested. The M_2 seeds were sown in sand in plastic trays and inoculated with a mixture of rhizobium strains. About 27000 M_2 plants were scored during the winter in the greenhouse at about 18^{o}C with supplementary fluorescent light and fertilized with a PK fertilizer. Chlorophyll mutants were counted and discarded.

	EMS treatment	M_2 plants	% chlorophyll mutants
(a)	0.1% overnight	6255	2.68
(b)	0.5% 1 hour	11223	1.53
(c)	0.5% 2 hours	9534	1.67

M_2 plants with nitrogen deficiency symptoms, yellowing from the root upwards, were taken out of the sand and scored for white, green or no nodules. Tentative mutants were planted in soil and the progeny retested.

Until now three non-nodulating mutants have been confirmed. A mutant with large red nodules, but poor growth and low nitrogen fixation is being further investigated. Non-confirmed mutants have been "slow" chlorophyll mutants or plants with nodules destroyed by Pythium species.

REFERENCES

[1] JACOBSEN, E. and FEENSTRA, W.J., A new pea mutant with efficient nodulation in the presence of nitrate. Plant Sci. Let. 33 (1984) 337-344.

[2] KNEEN, B.E. and LARUE, T.A., Nodulation resistant mutant of Pisum sativum (L.). J. Hered. 75 (1984) 238-240.

[3] MESSAGER, A., DUC, G. and PICARD, J., Study on possibilities of breeding for a higher nitrogen fixation ability in peas (Pisum sativum) and faba beans (Vicia faba L.). Abstract from the OECD-workshop "Interactions between carbon dioxide and nitrogen assimilation in higher plants" Zürich (1983) p.45.

(Contributed by K.C. Engvild, Agricultural Research Department, Risö National Laboratory, DK-4000 Roskilde, Denmark).

Utilization of a yellow seeded Trombay mustard mutants in cross breeding

Indian or oriental mustard (Brassica juncea (Linn.) Czern & Coss.) available in the germplasm collection in India until late 1960s were with black or brown seed coats. A yellow seed coat mutant TM-1 (Trombay Mustard-1) was produced at this Research Centre by Nayar [1]. since then attempts have been made to evolve improved varieties of mustard with yellow seed coat [2,3]. TM-4, TM-9 and TM-12 with yellow seed coats were developed after hybridizing TM-1 with Varuna, the black seeded national check cultivar. At Trombay, they were earlier in flowering and produced higher seed yield than TM-1 and Varuna. Their overall crop duraton was around 100 days, compared to 116 days for Varuna. The oil content in the yellow seed coat cultivars was 36% compared to 34% in Varuna. Further, it was reported that the feeding value of seed meal after oil extraction is superior for the yellow seeded coat and less crude fibre [4]. TM-4, TM-9 and TM-12 were tested for their yield potential in the All India Co-ordinated Research Project on Oilseeds (AICORPO) for five years. They performed better in the eastern parts of the country and in Rajasthan State, because of their short duration.

Earlier, Brassica campestris var. yellow sarson was widely cultivated in India. Gradually the polyploid species B. juncea with black or brown seeds is replacing yellow sarson, but consumers prefer yellow seeds and are willing to pay a higher price. Therefore, one of the priority objectives in breeding programmes of AICORPO is to develop improved cultivars of mustard with yellow seed coat. According to the 1983 AICORPO Rapeseed and Mustard Report, breeders are using the yellow seeded mutant TM-1 and its derivatives extensively in crossing programmes, e.g. at GB Pant University of Agriculture and Technology, Pant Nagar; Agricultural Research Station, Durgapura, and Haryana Agricultural University, Hissar. F_2 seeds of some crosses are made available upon request to other breeding stations by Dr. P.R. Kumar, Haryana Agricultural University, Hisar, Haryana State, India.

REFERENCES

[1] NAYAR, G.G., Seed colour mutations in Brassica juncea. Hook f. & Thomas induced by radioactive phosphorus ^{32}P. Sci. and Cult. 34 (1968) 421-422.

[2] NAYAR, G.G., Induced mutations in mustard (Brassica juncea). Mutation Breeding Newsletter No. 10 p.9.

[3] NAYAR, G.G., Breeding strategy for the improvement of mustard (Brassica juncea Coss.). In Proceed. Symp. The Role of Induced Mutations in Crop Improvement, Osmania University (1979) 358-270.

[4] PATHAK, R.K., Highlights of biochemical studies in rape seeds mustard. Presented under the AICORPO Project at Rape seeds-Mustard Research Workers Group Meeting held at Hisar, Haryana, on 18 - 20 August 1983.

(Contributed by V. Abraham and C.R. Bhatia, Biology and Agriculture Division, Bhabha Atomic Research Centre, Trombay, Bombay 400 085, India).

Comparative studies on callose formation in powdery mildew compatible and incompatible barley

Callose formation in barley mutants, lines and varieties with different genes for resistance to powdery mildew in seven different loci was compared. Only barley with resistance genes in the ml-o locus showed so early a callose formation passing off at such a high rate that it prevented fungal penetration. Ml-(La) resistant varieties and near-isogenic lines in 'Manchuria' with resistance genes in five other loci showed only a tendency to a larger callose formation than their susceptible counterparts after inoculation with avirulent as well as virulent powdery mildew.

The callose formation in ml-o resistant barley was independent of the powdery mildew culture applied. This supports the hypothesis set forth as to why the ml-o mutants are resistant against all known cultures or races of barley powdery mildew, and why this resistance may be more durable than other powdery mildew resistances. Further, this is the first case where the effect of callose refers to the action of a specific gene.

Six susceptible Japanese varieties formed very large appositions but they were initiated as late as in other susceptible varieties, and their colour was paler than in other barleys.

Nine Hordeum species fell in one group with small appositions and another with appositions of the most common size in barley. Wheat reacts strongly with deep coloured appositions, rye with haloes with a somewhat diffuse margin, and oats with large, central spots (papillae) nearly without any halo.

(Abstract of paper published in Phytopath. Z., 109, 147-168 (1984) by J.P. Skou, J. Helms Jörgensen and Ulla Lilholt, Risö National Laboratory, Roskilde, Denmark).

Screening for spontaneous virulent mutants of barley powdery mildew

Seedlings of four barley lines with powdery mildew resistance genes Ml-al, Ml-a6, Ml-al2, or Ml-g were inoculated with an avirulent powdery mildew culture. In total 50 million viable conidia were screened for the occurrence of spontaneous virulent mutants during 30 cycles of screening. Forty-three putative virulent mutants were selected, multiplied and tested. They comprised five different genotypes according to their virulence spectrum on about 25 different hosts. Based on virulence spectra, three of the types were rejected as not being of mutational origin, and the verification of the remaining two types was not consistent with the expectations from a gene-for-gene interaction. Assuming that none of the five genotypes were of mutational origin, the spontaneous mutation frequency from avirulence to virulence in barley powdery mildew is therefore below 2×10^{-8}.

REFERENCE

TORP, J. and JENSEN, H.P., Screening for spontaneous virulent mutants of Erysiphe graminis DC. f. sp. hordei on barley lines with resistance genes Ml-al, Ml-a6, Ml-al2, and Ml-g. Phytopath. Z. (1984) in press.

(Contributed by H. Jensen, Agricultural Research Department, Risö National Laboratory, DK-4000 Roskilde, Denmark).

"Co2" a new high yielding mutant variety of groundnut

Groundnut is an important oilseed crop in India. In Tamil Nadu it is cultivated on nearly 1 million hectares, 13% of the area under groundnut in India. Limited variability in the germplasm imposes a restriction on improvements that could be obtained through recombination. Investigations commenced in 1973 to develop new genotypes through mutagenesis.

Soaked seeds of Pol-1 groundnut were treated with ethyl methane sulphonate (EMS) at 0.04, 0.06, 0.08, 0.1 and 0.2 percent. The populations from these treatments were carried forward to M2 and M3generations. Selections were made in M3 for number of pods per plant, shelling percentage and other economic characters. The selected

Table Performance of groundnut Mutant 3

Location	No. of trials	Pod yield in kg/ha			% of increase over	
		Mutant 3	Col	TMV12	Col	TMV12
I Rainfed						
Coimbatore Campus	3	1644	1313	1051	25.2	56.4
Regional Agric. Stations	2	937	793	–	18.1	–
Adaptive Research Trials in farmers holdings	32	1240	1083	1125	14.5	10.2
Mean		1274	1063	1088	19.9	17.1

Table Performance of groundnut Mutant 3

Location	No. of trials	Pod yield in kg/ha Mutant 3	Col	TMV12	% of increase over Col	TMV12
II Irrigated						
Coimbatore Campus	3	2710	2248	2524	20.6	7.4
Regional Agri. Stations	3	1050	903	845	16.2	24.2
Adaptive Research Trials in farmers holdings	18	2033	1773	1836	14.7	10.7
Mean		1931	1641	1735	17.7	11.3

lines were further observed for uniformity in M4 and M5 generations and several of them were tested in replicated yield trials from 1979 onwards. Mutant line No. 3, derived from 0.2% EMS treatment was found to be particularly promising and therefore was further tested for its yield potential under rainfed as well as irrigated conditions along with standard varieties Col and TMV12 presently under cultivation. Mutant 3 exceeded these varieties considerably in yield at all test sites (Table).

Based on the good performance, groundnut Mutant 3 was released as variety "Co2" for general cultivation in Tamil Nadu.

(Contributed by M.R. Sivaram, S.R. Sree Rangasamy and R. Appadurai, Tamil Nadu Agricultural University, Coimbatore 641 003, India).

Induced mutations in roses

A number of new rose varieties have been produced at IARI, New Delhi (Kaicker and Swarup 1971, 1978); (Swarup, Kaicker and Gill 1971) and (Kaicker 1982, 1983) through the use of both physical and chemical mutagens. IAEA varieties from induced mutants that have been commercialized and are very popular with rose growers are Abhisarika, Madhosh, Pusa Christina and Striped Christian Dior (IARI, 1971).

Recently investigations were carried out at IARI, New Delhi on the effects of gamma irradiation on sprouting, survival, growth, flowering behaviour and induction of somatic mutations in hybrid tea rose cultivars, Folklore (Kordes 1978) and Doris Tystermano (Wisbech 1975).

The former is a great exhibition and cut variety of ravishing 25 - 30 petals beauty with long pointed buds which unfurl to large perfectly formed blooms of a rich salmon orange colour with a light yellow reverse. The latter is perfectly shaped with tangerine and gold colour deepening to orange at the petal edges.

10 to 15 cm long scions having 4-6 healthy buds of about one year old growth were taken from October pruning. They were irradiated in a 2000 curie ^{60}Co source, at the Division of Genetics, I.A.R.I. (dose rate 2.0 kR per minute, dose 2.5 to 5 kR). The irradiated bud was

afterwards removed from the scion wood and propagated by T-budding on Rosa indica - odorata rootstock.

The sprouting of buds decreased with increase of gamma irradiation dose. After one year of growth in treated plants show still a dwarfing effect of the treatment.

Interesting mutants obtained are the following:

Orange Folklore: A highly attractive mutant which occured from 2.5 kR treatment first as a periclinal chimera; It has more than 35 petals of yellow group 13-B (R.H.S. colour chart). Outer petals are with yellow orange colour (group 15-A). Older petals of the first whorl are shaded orange (29-C). It was isolated as solid mutant in MV_2.

Orange Folklore with tipped pink petals: This highly attractive mutant (from 2.5 kR) has an increased petal number (50-55) and yellow orange colour of the petals with blush pink petal edges. It was obtained as a periclinal chimera. The mutants of Folklore differ in Florachrome B content.

Doris Tystermann with less number of petals: This mutant (from 4 krad treatment) had 18-20 petals instead of 25-30 petals with tangerine colour darkening to orange at petal edges as in the control.

REFERENCES

KAICKER, U.S. and SWARUP, V., Induced mutations in roses. Indian Journal Gen. and Plt. Breeding 32 (2) (1971) 257-265.

KAICKER, U.S. and SWARUP, V., Induced mutations in the rose cv. Gulzar and effects of chemical and physical mutagens on plant growth. Acta Agronomica Acad. Sci. Hung. 27 (1978) 43-48.

KAICKER, U.S., Mutation breeding in roses. The Indian Rose Annual II (1982) 35-42.

KAICKER, U.S., A Silver Jubilee on rose breeding in India. Chronica Horticulture 23 (1983) p.40.

(Contributed by U.S. Kaicker and D. Dhyani, Division of Floriculture and Landscaping, Indian Agricultural Research Institute, New Delhi 110012, India).

Resistance of Indonesian mutant lines to the brown planthopper Nilaparvata lugens

We tested seven mutant rice lines, derived from BPH susceptible Pelita I/1, for resistance to BPH at IRRI. The lines came from the National Atomic Energy Agency in Jakarta, Indonesia. They were Atomita 1, 627/10-3/PsJ, Atomita 2 and 627/4-E/PsJ, derived from Pelita I/1 irradiated with 0.2 kGy of gamma rays; and A227/2/PsJ, A227/3/PsJ and A227/5/PsJ derived from an early maturing mutant of Pelita I/1 irradiated with 0.1 kGy of gamma rays. We conducted two tests with five replications to measure their level of resistance to BPH: seedbox screening for plant damage, and population growth.

In the seedbox screening test, seeds of entries were planted in seedboxes. Seven days after sowing, they were infected with eight second and third-instar BPH nymphs/seedling. Plant damage was rated when the susceptible check died. In the second test, 30 days old test plants were infested with 5 pairs (male and female) of 2 to 3 days old adult BPH and enclosed with mylar film cages. When their progeny reached adulthood on susceptible TN1 plants, the insects in all the cages were counted.

The Indonesian mutant lines were resistant to moderately resistant to biotype 1 and biotype 3, but susceptible to biotype 2. Similar seedbox screening tests showed the mutant lines were moderately resistant to green leafhopper and whitebacked planthopper, as compared with susceptible TN1.

Atomita 2 has been released for commercial cultivation in Indonesia. In addition to its resistance to BPH biotype 1 and biotype 3, it has high yield potential, good eating quality, and salinity tolerance.

(Cited from article by P.S. Mugiono, National Atomic Energy Agency, Jakarta, Indonesia and E.A. Heinrichs and F.G. Medrano, IRRI, in International Rice Research Newsletter No. 9 p.5 October 1984).

Mutant varieties in Finland

Often the question is raised as to the commercial value of mutant varieties. Here are some data:

Species	Name of variety	year released	1982 cultivated area	
			ha	% of species
spring wheat	Taara	1978	8000	6% of all spring wheat
winter rye	Jussi	1975	6 000	15% of all winter rye
spring barley	Balder J.	1960		not cultivated any more
	Aapo	1975	10 000	2% of all barley
	Eero	1975	32 000	6% " "
oat	Ryhti	1970	110 000	24% of all oat
	Puhti	1978	103 000	23% " "
	Nasta	1979	55 000	12% " "
	Veli	1981	1 000	1% " "

(Contributed by E.I. Kivi, Hankkija Plant Breeding Institute, SF-04300 Hyryä, Finland).

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 (peanut)			
Yeuyou No. 22	China, 1968 Guangdong Acad.of Agric.Sci. Guangdong	Yushi (Beta ray induced mutant) x Fuhuasheng	dwarf higher pod number, higher yield, cultivated on more than 100 000 ha
Yeuyou 551	China, 1972 Guangdong Acad.of Agric.Sci. Guangdong	Yeuyou no. 22 x Yeuyou 431	dwarf higher pod number, higher yield, cultivated on more than 100 000 ha
Avena sativa (oat)			
Puhti	Finland, 1978 O. Inkilä Plant Breeding Dept. Agric. Res. Centre Jokioinen	Hannes x Ryhti	high yield ability, stiff straw, good grain quality, moderate earliness
Brassica napus (rape)			
Ganyou No. 5	China, 1977 Inst. of Oil Crops Chinese Acad.of Agric.Sci.	Gamma rays 140 kR [Shengliyoucai]	cold tolerance, disease resistance, higher and stable yield, cultivated on more than 100 000 ha

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
Brassica pekinensis (chinese cabbage)			
Baicai No. 9	China, 1978 Institute of Vegetable and Forest Heilongjiang Acad.of Agric.Sci. Heilongjiang	Gamma rays 80 kR [Kerr/Feichenghuaxin]	early maturity, good storage quality, higher yield
Forsythia x intermedia			
Courtalyn	France, 1984 A. Cadic INRA Beaucouze F-49000 Angers	Gamma rays 7 kR, 1970 [Lynwood]	more erect form with dwarf internode, blooming on one year old shoot
Courtadic	France, 1984 A. Cadic INRA Beaucouze F-49000 Angers	Gamma rays 7 kR, 1970 [Vitellina]	great number of slender ramifications and dense blooming, possible use as ground cover
Glycine max. (soybean)			
Heinoun No. 4	China, 1967 Heilongjiang Acad.of Sci. Heilongjiang	Gamma rays 10 kR [Mancangjin]	compact branched type
Heinoun No. 5	" "	Gamma rays 10 kR [Dongnoun No. 4]	good root system, short internode, higher branch and pod number
Heinoun No. 7	" "	" "	" "
Heinoun No. 8	" "	" "	10 days earlier than original variety, humidity tolerance

Heinoun No. 16	China, 1970 Heilonjiang Acad.of Sci.	Gamma rays 10 kR [F_2 (Wudingzhu x Jingshanpu)]	higher branch number, short internode, drought tolerance, wide adaptabi- lity, cultivated on more than 100 000 ha
Heinoun No. 26	China, 1976 Heilongjiang Acad.of Sci.	Ha 2294 x Xiaojinhuang No.1	good stature, cold, drought and waterlogging tolerance, good quality cultivated on more than 100 000 ha
Tiefeng 18	China, 1973 Tieling Regional Inst.of Agric. Sci., Liaoning	Gamma rays 12 kR [45-15/5621]	fertility tolerance, lodging resistance, higher yield, good quality, cultivated on more than 100 000 ha
Mushi No. 6	China, 1980 Mudanjiang Normal College Heilongjiang	Gamma rays 12 kR [Fengshou No. 10 x Jilin No.3]	
Hordeum vulgare (barley)			
Aizao No. 3	China, 1977 Yenchen County Inst.of Agric.Sci. Jiangsu	Gamma rays 22 kR	early maturity, short straw, lodging resistance, higher yield, cultivated on more than 100 000 ha
Troja	Sweden, 1981 G. Persson Svalöv AB	Å61657 x (Mari^5 x triple awn lemma)	high yield lodging resistance
Lina	Sweden, 1982 G. Persson Svalöv AB	Lofa x (Å6564 x /Mari backcrossed x Multan/)	higher yield lodging resistance
Oryza sativa (rice)			
Xiongyue 613	China, 1965 Xiongyue Inst.of Agric.Sci. Liaoning	Gamma rays 20 kR [Nongkeu 20]	moderate resistance to blast, higher yield, good quality

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
Fushe 31	China, 1965 Fujian Acad.of Agric.Sci.	Gamma rays 25 kR [Lucai]	early maturity, short culm, resistance to stress, suitable for mountain area
Fulianai	China, 1966 Zhejiang Agric.Univ.	Gamma rays 20 kR [Liantangzao]	short culm, blast resistance
Aifu No. 9	China, 1966 Wenzhou Regional Inst.Agric.Sci. Zhejiang	Gamma rays 30 kR	short culm, blast resistance, higher yield, cultivated on more than 100 000 ha
Erfuzao	China, 1968 Wenzhou Regional Inst.of Agric.Sci. Zhejiang	Gamma rays 30 kR [Erjiuai No. 7]	early maturity
Fuyu No. 1	China, 1968 Zhejiang Acad.of Agric.Sci.	Gamma rays 15 kR [Erjiuai No. 7]	10-15 days earlier than original variety, good stature
Huangpiai	China, 1969 Guangdong Acad.of Agric.Sci.	Gamma rays 30 kR [Huangpizhong]	short culm
Jinfu No. 1	China, 1969 Tianjin Inst.of Agric.Sci.	Gamma rays 30 kR [Jinyin 37]	7 days earlier than original variety, blast resistance
Jinfu No. 8	China, 1969 Tianjin Inst.of Agric.Sci.	Gamma rays 30 kR [Xiaozhan 101]	early maturity, shorter culm, Xanthomonas resistance

Fuzao No. 2	China, 1970 Zhejiang Agric.Univ.	Gamma rays 30 kR [Erjiuai]	15 days earlier than original variety, bigger spike
Fuxuan No. 3	China, 1970 Sichuan Inst.of Nucl.Technique	Gamma rays 30 kR [Fuxuan No. 1]	good tillering, blast resistance
Zhenfu No. 1	China, 1971 Guangxi Acad.of Agric.Sci.	Gamma rays 30 kR [Zhenshuai]	10 days earlier than original variety, good tillering, lodging resistance
Fushe 94	China, 1971 Sichuan Acad.of Agric.Sci.	Neutrons [Daaizhi]	early maturity, good tillering, blast resistance
Fuxuan 124	China, 1972 Sichuan Inst.of Nucl.Technique	Gamma rays 30 kR [Guangxuan]	blast resistance, intermediate maturity
Jiasifu	China, 1973 Jiaxing Regional Inst.of Agric. Sci. Zhejiang	Gamma rays 30 kR [Jiahu No. 4]	early maturity, short culm, good tillering
Yifunuo No. 1	China, 1973 Yibin Regional Inst.of Agric.Sci. Sichuan	Gamma rays 10 kR [mutant of IR8]	blast resistance, bigger spike, higher grain number
Fu 709	China, 1974 Pinghu County Inst.of Agric.Sci. Zhejiang	Gamma rays 30 kR [Nonghu No. 6]	higher yield, cold re-resistance
Xiaofuzao	China, 1974 Xiaogan County Inst. of Agric. Sci. Hubei	Gamma rays 30 kR [Liantangzao]	early maturity, short culm

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
Wangeng 257	China, 1975 Hubei Acad. of Agric. Sci.	Gamma rays 30 kR [Huxuan 19]	fertilizer tolerance, blast resistance, higher yield, cultivated on more than 100 000 ha
Xiangfudao	China, 1976 Hunan Acad. of Agric. Sci.	Gamma rays 30 kR [Erjinqing]	cold tolerance in seeding period, blast and Xanthomonas resistance
Zhongbao No. 2	China, 1976 Southern China Inst.of Botany Guangdong	Fast neutrons	early maturity, short culm
Guifu No. 3	China, 1977 Fujian Acad.of Agric.Sci.	Gamma rays 30 kR [Guiluai No. 8]	early maturity, cold re- resistance, blast tolerance
Wanfu 33	China, 1978 Wan County Regional Inst.of Agric.Sci. Sichuan	Gamma rays 30 kR [72-10]	early maturity, cold re- resistance, blast tolerance
Juangyebai	China, 1978 Fujian Acad.of Agric.Sci.	Neutrons [IR8]	roll of leaf, good stature, good tillering, blast resistance
Fuwan 23	China, 1978 Inst.of Appl.of Atomic Energy Hubei Acad.of Agric.Sci.	Gamma rays 30 kR [Huxuan]	yellow stunt and Xanthomonas resistance, bigger spike and large grain, good quality
Zhengguang No. 1	China, 1978 Qichen County Farm of Original Seed Hubei	Gamma rays 30 kR [Taizhongyu 39]	yellow stunt resistance

Fuzhu	China, 1979 Inst.for Appl.of Atomic Energy Hubei Acad.of Agric.Sci.	Gamma rays 35 kR [Zhulianai]	early maturity, cold tolerance, blast resistance, lodging resistance
Guangdabai	China, 1979 Fujian Acad.of Agric.Sci.	[Hong 410]	intermediate maturity, higher yield
Suifu 17	China, 1979 Liouzhou Regional Inst.of Agr. Sci. Guangxi	Gamma rays 30 kR [Suiyia 156]	40 cm shorter than original variety, higher yield
Shuangchengnuo	China, 1980 Jiangsu Acad.of Agric.Sci.	Gamma rays 30 kR [2004]	compact type, lodging resistance, good taste
Zhefu 802	China, 1980 Zhejiang Agric. Univ. Yuhong County Inst.of Agri.Sci.	Gamma rays 30 kR [Simei No. 2]	early maturity, higher yield disease resistance, cultivated on more than 100 000 ha
7738	China, 1980 Lixiahe Regional Inst.of Agric.Sci. Jiangsu	Gamma rays 30 kR [Guangbeiguang]	early maturity, higher yield, disease resistance, plant hopper resistance
Calmochi 202	USA, 1981 H.L. Carnahan, C.W. Johnson, S.T. Tseng J.N. Rutger - California Coop.Rice Res. Found.Inc., Biggs CA - California Agric.Exp.Station, AR-SEA-USDA Davis CA	R57-362-4 (=Colusa x CS-M3)/D51//Calmochi 201	short, glutinous (waxy) grain, awnless short stature (88 cm)
M-302	USA, 1981 C.W. Johnson, H.L. Carnahan S.T. Tseng, J.E. Hill - California Coop.Rice Res. Found.Inc. Biggs CA - California Agric.Exp.Station AR-SEA-USDA Davis CA	Calrose 76/CM-M3//M5	short stature (96 cm) intermediate maturity, medium grain shape, more lodging resistant and higher yielding than M-301

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
Kefuhong No. 2	China, 1981 Lianchen County Inst.of Agri. Sci. Fujian	mutant IR8 x Hong 410	early maturity, blast resistance
Guangfu No. 1	China, 1981 Fuchou City Inst.of Agric.Sci. Fujian	Gamma rays + laser [Hong 410]	mid-early maturity, good tillering
Hongnan	China, 1981 Guangxi Acad.of Agric.Sci.	Gamma rays 30 kR [F_2 (Hongmeizao x Guangnan)]	intermediate maturity, cold tolerance at seeding period, bigger spike, cultivated on more than 100 000 ha
M114	China, 1981 Jiangxi Acad.of Agric.Sci.	Gamma rays 30 kR [5450 x Yinnisuitiangu]	cold tolerance, Fulgorid resistance
Shuangke No. 1	China, 1981 Zhejiang Agric.Univ.	IR24 x Kefuzao	intermediate maturity, higher yield, higher temperature tolerance
Atomita 2 (627-5/PsJ)	Indonesia, 1983 M. Ismachin Kartoprawiro, Mugiono Suwarno, Giman Sujono and Tatang Rustandi Centre f. Appl.of Isotopes and Radiation (BATAN) Jakarta	Gamma rays 40 kR seeds 1974 [Pelita I/1]	early maturity, resistance to BPH biotype 1, high tolerance to salinity, high protein content

<u>Prunus avium</u> (sweet cherry)			
Lapins	Canada, 1983 K.O. Lapins W.D. Lane Agric. Canada Research Station Summerland	Van x <u>Stella</u> selected 1971	fruit resembles Lambert, but larger, firmer, ripens 2 days later, tree upright growth habit, self fertile, more productive than most commercial cultivars
Sunburst	Canada, 1983 K.O. Lapins W.D. Lane Agric. Canada Research Station Summerland	Van x <u>Stella</u> selected 1971	fruit resembles Stella, very large, resists rain splitting, not as firm as Bing or Van, matures with Van tree, good growth habit, self fertile, very productive
<u>Sorghum vulgare</u> (sorghum)			
Jinza No. 1	China, 1970 Inst. of Economic Crop Shanxi Acad.of Agric. Sci.	3197A x <u>Jinfu No. 1</u>	quality improved, higher yield, wide adaptability, cultivated on more than 100 000 ha
Longfuliang No. 1	China, 1979 Inst.for Appl.of Atomic Energy Heilongjiang Acad.of Agric.Sci.	Gamma rays 20 kR [Xinliang No. 7]	early mturity, short straw, suitable for close planting
<u>Triticum aestivum</u> (bread wheat)			
092	China, 1966 Southwest Agric. College Sichuan	Gamma rays 20 kR [Nanda 2419]	early maturity, higher yield stripe and stem rust resistance, lodging resistance
Taifu No. 1	China, 1966 Shanxi Acad.of Agric.Sci.	Gamma rays 20 kR [Nounda 183]	early maturity, stripe rust resistance, drought tolerance
Emai No. 6	China, 1966 Hubei Acad.of Agric.Sci.	Gamma rays 30 kR [Nanda 2419]	rust resistance, higher and stable yield, wide adaptability, cultivated on more than 100 000 ha

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
1161	China, 1966 Hubei Acad.of Agric.Sci.	Gamma rays 30 kR [Nanda 2419]	cold tolerance, stripe rust resistance
Taifu 23	China, 1968 Shanxi Acad.of Agric.Sci. Shanxi	Gamma rays 30 kR [Nounda 183 x Neixiang No. 5]	drought tolerance, dry and hot wind tolerance
Yuanfeng No. 1	China, 1968 Inst. for Appl.of Atomic Energy Shandong Acad.of Agric.Sci.	Gamma rays 30 kR [Bima No. 4]	cold tolerance, lodging resistance, stripe rust resistance
Yuanfeng No. 2	China, 1968 Inst. for Appl.of Atomic Energy Shandong Acad.of Agric.Sci.	Gamma rays 30 kR [Bima No. 4]	cold tolerance, lodging resistance, stripe rust resistance
Luten No. 1	China, 1968 Shicun, Ten County Shandong	Gamma rays 30 kR [Huixianhong]	semi-dwarf straw, lodging resistance, stripe rust tolerance, cultivated on more than 100 000 ha
Qunzhong 42	China, 1968 Zhenjiang Regional Inst.of Agric.Sci. Jiangsu	Gamma rays 30 kR [Nannoundaheimang]	bigger spike, large grain, stripe rust resistance
Jienmai No. 2	China, 1969 Shanxi Acad.of Agric.Sci.	Gamma rays 20 kR [Beijing No. 6]	early maturity, drought tolerance, stripe rust resistance
Yuanfeng No. 3	China, 1971 Inst. for Appl. of Atomic Energy Shandong Acad.of Agric.Sci.	Gamma rays 20 kR [Afu]	cold tolerance, white grain, good quality

Xinshukuang No. 1	China, 1971 Heilongjiang Acad.of Agric.Sci.	*Gamma* rays 8 kR [AboM_4 x Orofen]	disease resistance, strong stalk, large grain, cultivated on more than 100 000 ha
Ningmai No. 3	China, 1973 Jiangsu Acad.of Agric.Sci.	Gamma rays [st2422/464/506]	bigger spike, more resistance to stem and leaf rust and powdery mildew, cultivated on more than 100 000 ha
Yannoun 685	China, 1974 Yantai Regional Inst.of Agric. Sci. Shandong	Youbo x <u>Fusi No. 4</u>	rust resistance, good colour at maturity stage
Jingfen No. 1	China, 1977 Department of Biology Nankai University	Gamma rays 10 kR [Shijiazhuang 63]	early maturity, short culm, lodging resistance, cultivated on more than 100 000 ha
Yuanfeng No. 4	China, 1978 Inst. for Appl.of Atomic Energy Shandong Acad.of Agric.Sci.	Gamma rays 30 kR [Taishan No. 1]	short straw, lodging resistance, higher yield, cultivated on more than 100 000 ha
Changwei 19	China, 1978 Changwei Regional Inst.of Agric. Shandong	Gamma rays 35 kR [hairy Afu]	resistance to stripe rust and mildew, salt and alkaline tolerance, higher yield
Changwei 20	China, 1979 Changwei Regional Inst.of Agric. Shandong	Gamma rays 35 kR [hairy Afu]	stripe rust tolerance, fertility tolerance, good quality
Yuyuan No. 1	China, 1979 Inst.of Isotopes, Heinan Acad. Sci. Qilixen commune Heinan	Gamma rays 35 kR [F_2 (St2422/464/ x Neixiang No. 5)]	early maturity, lodging resistance, drought and salt tolerance, dry and hot wind tolerance, cultivated on more than 100 000 ha

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
Nanyang 75-6	China, 1979 Nanyang Regional Inst.of Agric. Sci. Heinan	Gamma rays + dES [F_2 (St2422/464/ x Neixiang No. 5)]	uniform, stripe rust resistance
Zhengliufu	China, 1979 Heinan Acad.of Agric.Sci.	Gamma rays 30 kR (twice) [Zhengzhou No. 6]	drought tolerance, stripe rust resistance
Yuandong No. 1	China, 1979 Inst.for Appl.of Atomic Energy Chinese Acad.of Agric.Sci.	Gamma rays 25 kR [Zaoyang x Dongfenhong]	early maturity, stripe rust resistance, good colour at maturity stage, good quality
Wanyuan 28-88	China, 1979 Nanyang Regional Inst.of Agric. Sci. Heinan	Gamma rays [F_2 (St2422/464 x Neixiang No. 5)]	shorter straw
Yunfuzao	China, 1980 Inst. of Cotton Shanxi Acad.of Agric.Sci.	Gamma rays 30 kR [Fengchen No. 2/ Bima No. 4 x Nanda 2419]	early maturity, disease resistance, fits well for cotton/wheat rotation
79p-17	China, 1980 Inst. for Appl.of Atomic Energy Sichuan Acad.of Agric.Sci.	Beta rays 10μc/grain [Chuanyu No. 5]	early maturity, disease resistance, tolerance of humidity
Kijanka	USSR, 1981	0,0125% DES, seeds, 1968	high yield

Vigna unguiculata (cowpea)			
V16 (Amba)	Varanasi, India, 1981 B. Sharma IARI Div. of Genetics New Delhi	seeds DMS 1966 [Pusa Phalguni]	highest yielding variety of cowpea in India. Resistant to fungal and bacterial diseases
V37 (Shreshtha)	Varanasi, India, 1981 B. Sharma IARI Div. of Genetics New Delhi	seeds DMS 1966 [Pusa Phalguni]	high yield, luxuriant vegetative growth, therefore also suitable as green fodder
V 38 (Swarna)	Varanasi, India, 1981 B. Sharma IARI Div. of Genetics New Delhi	seeds DMS 1966 [Pusa Phalguni]	high yield, early maturity, synchronous flowering, better quality pods and grain. Almost immune to most diseases of the region
V 240	Kanpur, India, 1984 B. Sharma IARI Div. of Genetics New Delhi	seeds DMS 1966 [Pusa Phalguni]	high yield, resistant to all major fungal, bacterial and viral diseases
Weigela Thunb.			
Couleur d'Automne Courtatom	France, 1979 L. Decourtye INRA Beaucouze F-49000 Angers	Gamma rays 5kR, 1972 [Le Printemps]	variegated leave, turning red in autumn
Rubivif Courtavif	France, 1980 L. Decourtye INRA Beaucouze F-49000 Angers	Gamma rays 5kR, 1972 [Bristol Ruby]	brighter red flower colour, does not turn purple when getting old. Better renewal of the shrub by more sprouts

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
Zea mays (maize)			
Jidan 101	China, 1974 Jilin Acad.of Agric.Sci.	Ji63 x Mo 14	good root, lodging resistance resistance to leaf spot, good quality, cultivated on more than 100 000 ha
Luyuandan No. 1	China, 1976 Inst. for Appl.of Atomic Energy Shandong Acad.of Agric.Sci.	Hunfeng 100 x Va 35	leaf spot resistance, bigger grain, good quality
Luyu No. 3	China, 1980 Liaocheng Regional Int.of Agric.Sci. Shandong	Yuanwu 02 x Hunzao No. 4	disease resistance, higher yield, cultivated on more than 100 000 ha
Yuanlian No. 5	China, 1980 Inst. for Appl. of Atomic Energy Chinese Acad.of Agric.Sci.	Zi 330 x Yuanfu 01	early maturity, leaf spot resistance, suitable for close planting, good quality
Luyuandan No. 7	China, 1981 Inst. for Appl. of Atomic Energy Shandong Acad.of Agric.Sci. Shandong	Hunfeng 100 x Mo 17	long ear, leaf spot resistance
Luyuanshan No. 2	China, 1981 Inst.for Appl.of Atomic Energy Shandong Acad.of Agric.Sci. Shandong	(Yuanwu 02 x Weifng 322) Hunzao No. 4	disease resistance, higher yield, cultivated on more than 100 000 ha
Zhongyuandan No. 4	China, 1982 Inst.for Appli.of Atomic Energy Chinese Acad.of Agric.Sci.	Yuanfu 17 x Hunzao No. 4	early maturity, resistance to leaf spot, higher yield

New Publications

Handbook of Plant Cell Culture
Evans, D.E., Sharp, W.R., Ammirato, P.V., Yamada, Y. (Eds.):
Vol.1 Techniques for Propagation and Breeding
Vol.2 Crop Species

Macmillan Publishing Co. New York 1983/84.

In spite of numerous books and proceedings from international symposia summarizing the status and progress in the field of plant tissue and cell cultures, a complete survey of problems, methods and applications of this fast developing scientific discipline has not yet been available. This gap will be plugged by Macmillan Publishing Company, New York publishing the Handbook of Plant Cell Culture in several volumes dealing with basic and specialized techniques of in-vitro plant cell cultures and their application in plant biotechnology, breeding and agriculture. The first volume entitled "Techniques for Propagation and breeding" appeared in 1983, the second volume "Crop Species" in 1984.

Volume 1 contains basic information concerning fundamental techniques and problems of plant cell cultures, e.g. organogenesis, embryogenesis, cultivation of protoplasts, somatic hybridization, in-vitro selection, meristem cultures and haploid production, but also deals with specifics of plant cell culture, genetics and physiology, including molecular techniques and biochemical mechanisms. Volume 1 also reviews cell culture application for chemical compound production, plant breeding, nitrogen fixation, and germplasm preservation. An international team of authors gives a critical account of literature and practical guidance for the application of in-vitro techniques. Numerous references supplement the summary tables so that the reader obtains quick lucid information but can also follow up the details. Owing to precise methodical protocols the book becomes essentially a manual for planning and conducting the initial experiments by students and by research workers who are beginners in the particular field. Experienced workers, on the other hand, will find here a uniquemethodical survey covering the relevant aspects of plant cell cultures. Authors also attempt to outline further developments and possible future applications.

Volume 2 deals with crop plants and their genetic improvement by using in-vitro culture techniques. A general overview of world crop production, food supply and trade attempts to set the stage for plant cell cuture techniques as a future means for reducing hunger and malnutrition, but another overview makes clear that cell culture techniques have to be carefully integrated into sound plant breeding programmes to have an impact upon crop production. Specific chapters of this volume deal with maize, oat, wheat, bean, clover, asparagus, celery, cassava, sweet potato, banana, papaya, apple, grape, conifers, date palm, rubber tree, sugarcane and tobacco. Volume 3 is expected to cover other crops.

List of trainees and fellowship holders in 1984

Ahmed, Z.U. (Bangladesh)	St. Lucia (Australia)
Nicoloff, Ch. (Bulgaria)	Leiden (Netherlands), Erlangen (FRG), Lund, Uppsala, Svalöv (Sweden)
Mugiono Pawiro, S. (Indonesia)	IRRI (Philippines)
Bieberach Forero, C. (Panama)	Olomouc (CSSR)
Phadvibulya, V. (Thailand)	FAO/IAEA Lab, Seibersdorf (Austria)
Droemer, E. (Uruguay)	" " "
Oropeza, E. (Venezuela)	" " "
Achutegui Betulu (Venezuela)	Seibersdorf (Austria)
Dang Van, H. (Vietnam)	Prague (CSSR)
Lingumbwanga, E. (Zambia)	FAO/IAEA Lab, Seibersdorf (Austria)

List of experts and consultants in 1984

Ahnström, G. (Sweden)	FAO/IAEA Lab, Seibersdorf (Austria)
Brunner, H. (IAEA)	Debrecen (Hungary)
Buiatti, M. (Italy)	FAO/IAEA Vienna (Austria)
Donini, B. (FAO/IAEA)	Piracicaba (Brazil) Quito (Ecuador) Maracaibo (Venezuela)
Dutrecq, A. (Belgium)	FAO/IAEA Vienna (Austria)
Guanren Xu (China)	" " "
Gustafsson, J.P. (USA)	Lima (Peru)
Helgeson, J.P. (USA)	FAO/IAEA Vienna (Austria)
Ingram, D.S. (UK)	" " "
Kiraly, Z. (Hungary)	" " "
Koch, E. (Fed. Rep. of Germany)	Bangkok, Chiang Mai (Thailand)
Maluszynski, M. (FAO/IAEA)	Mexico City (Mexico)
Menten, O.M. (Brazil)	FAO/IAEA Vienna (Austria)
Micke, A. (FAO/IAEA)	Debrecen (Hungry) Novi Sad (Yugoslavia) Peshawar, Tandojam (Pakistan) Sofia (Bulgaria)
Mikaelsen, K. (Norway)	Dalat (Vietnam) Jakarta (Indonesia)
Murty, R.R. (India)	Maracaibo (Venezuela)
Novak, F. (FAO/IAEA)	Kwabenya (Ghana)
Peacock, W.J. (Australia)	FAO/IAEA Vienna (Austria)
Sacristan, M.D. (Fed. Rep. of Germany)	FAO/IAEA Vienna (Austria)
Shaikh, M.A.Q. (Bangladesh)	FAO/IAEA Lab, Seibersdorf (Austria)
Shanmugasundaram, S. (AVRDC)	Jakarta (Indonesia)
Takagi, Y. (Japan)	Bangi (Malaysia)
Takebe, I. (Japan)	FAO/IAEA Vienna (Austria)
Wenzel, G. (FR Germany)	" " "
Won, J.L. (Rep. of Korea)	Kwabenya (Ghana)
Zadoks, J.C. (Netherlands)	FAO/IAEA Vienna (Austria)

Third FAO/IAEA Training Course on the Induction and Use of Mutations in Plant Breeding
FAO/IAEA Agricultural Biotechnology Laboratory
Seibersdorf (Austria), 3 April - 18 May 1984

Participants:
Lokman Hakim (Bangladesh)
José Otavio Machado Menten (Brazil)
Juan Antonio Izquierdo Fernandez (Chile)
Adolfo Leon Alvarez Faraco (Colombia)
Miroslav Griga (Czechoslovakia)
Theophilus Vincent Odarlah Lamptey (Ghana)
Mario Raul Morales Silva (Guatemala)
Rivaie Ratma (Indonesia)
Iradj Naghedi-Ahmadi (Iran)
Kamal Khairalla abu Salah (Jordan)
Ramli Othman (Malaysia)
Rodomiro Octavio Ortiz Rios (Peru)
Lech Roman Boros (Poland)
Monica Iuoras (Romania)
Nafie Ali Nafie (Sudan)
Valailak Phadvibulya (Thailand)
Ihsan Tutluer (Turkey)
Francisco Oropeza (Venezuela)
Nguyen Manh Don (Vietnam)
William Kanyanta Chishimba (Zambia)

FUTURE EVENTS

1985

11th International Sunflower Conference
Mar Del Plata, Buenos Aires, Argentina
10 - 13 March
Contact: Asociacion Argentina de Girasol
Av. Corrientes 127
1043 Buenos Aires, Argentina

17th Stadler Genetics Symposium on Genetics, Development and Evolution
University of Missouri, Columbia MO.
18 - 19 March
Contact: J.P. Gustafson
Columbia MO 65211, USA

Symposium on Aneuploidy: Etiology and Mechanisms
Washington D.C.
25 - 29 March
Contact: The Council of Research Planning
1718 Massachusetts Ave., N.W. Suite 600
Washington D.C. 20036-2077
Att. C.M. Wilson

International Rice Genetics Symposium
IRRI Los Banos, Philippines
27 - 31 May
Contact: G.S. Kush
IRRI, P.O. Box 933
Manila, Philippines

UN-ECE Symposium on the Importance of Biotechnology for Future Economic Development
Szeged, Hungary
3 - 7 June
Contact: K.A. Sahlgren, Exec. Secretary
Economic Commision for Europe
Palai des Nations 1211 Geneva 10
Switzerland

Sixth Meeting EUCARPIA Section on Oil and Protein Crops
Cordoba, Spain
5 - 8 June
Contact: J. Fernandez Martinez
Dept. de Mejor y Agronomia
Apartado 240
14071 Cordoba, Espana

EUCARPIA Cereal Section, Working Group on Rye
Svalöv, Sweden
11 - 13 June
Contact: EUCARPIA Meeting 1985
S-26800 Svalöv, Sweden

Biotechnology and Ecology of Pollen
Amherst MA, USA
8 - 11 July
Contact: D.L. Mulcahy
Botany Department
University of Massachusetts
Amherst MA 01003
USA

Second International Oat Research Workshop
University College of Wales, Aberystwyth, UK
15 - 18 July
Contact: D. Lawes
Welsh Plant Breeding Station
Plas Gogerddan
Aberystwywth, Dyfed, U.K.

FAO/IAEA International Symposium on Nuclear Techniques and In-Vitro Culture for Plant Breeding
Vienna, Austria
19 - 23 August
Contact: A. Micke
Joint FAO/IAEA Division
P.O. Box 100
1400 Vienna, Austria

Fourth FAO/IAEA Training Course on the Induction and Use of Mutations in Plant Breeding
Seibersdorf, Austria
17 September - 25 October
Contact: T. Hermelin
FAO/IAEA Agric. Biotechnology Laboratory
P.O. Box 100
A-1400 Vienna, Austria

International Symposium on Plant Breeding by Inducing Mutation and Using In-Vitro Biotechniques
Beijing (China)
16 - 20 October
Contact: Ms. Wang Lin-Quing
Inst. for Application of Atomic Energy
P.O. Box 5109
Beijing. People's Republic of China

1986

Fifth International Barley Genetics Symposium
Okayama University Kurashiki 710, Japan
6 - 11 October
Contact: S. Yasuda
Institute for Agric. and Biol. Sciences
Okayama University Kurashiki 710, Japan

FAO/IAEA Workshop on Improvement of Grain Legume Production Using Induced Mutations, Rome, Italy
Contact: A. Micke
Joint FAO/IAEA Division
P.O. Box 100
A-1400 Vienna, Austria

1987

IV International Botanical Congress Berlin (West), Germany
24 July - 1 August
Contact: Congress Secretariat Königin-Luise-Str. 6-8
D-1000 Berlin (West) 33

AWARD

The "President Award for Agricultural Development" 1980 - 1982 has been given to Dr. M.A.Q. Shaikh, Head of Plant Genetis Division, Bangladesh Institute of Nuclear Agriculture, Mymensingh, for developing the high yielding jute variety "Atompat-38" and the high yielding - high protein chickpea variety "Hyprosola" through the use of induced mutations. The varieties are recognized as a valuable contribution for increased crop production in Bangladesh.

Congratulations!!!

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 papges including tables. We regret that photographs cannot be accepted for technical reasons. Reference to publications containing a more detailed description of methods or evaluations of findings are welcome but should generally be limited to one or two.

Alexander Micke

Mutation Breeding Newsletter
Joint FAO/IAEA Division of Isotope and Radiation Applications of Atomic Energy for Food and Agricultural Development

International Atomic Energy Agency
Vienna International Centre
P.O. Box 100
A-1400 Vienna, Austria

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