Mutation Breeding Newsletter

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Report from the FAO/IAEA Plant Breeding and Genetics Section

31 January - 4 February 1977 the first "International FAO/IAEA Symposium on the Use of Induced Mutations for Improving Disease Resistance in Crop Plants" was organized at IAEA Headquarters in Vienna. The 52 papers presented touched upon almost every problem related to breeding disease resistant crop plant cultivars and gave 90 participants from 41 countries an opportunity to consider various schools of thought, to scrutinize different approaches towards improved and stable resistance, to evaluate the methodology available and so be better informed about the potential and limitations for using mutagenesis in improving disease resistance of crop plants. Availability or lack of suitable genetic resources, stability of the resistance in use and its genetic base, prediction of breakdown and future needs of resistance sources, screening techniques, transfer of alien genes, pathogen mutation, interaction of different pathogen species, genetics and cytogenetics of resistance, - these all were topics discussed besides the presentation of results from practical breeding programmes ranging from impressive achievements to lack of success in identifying mutagen induced genetic variability. Wheat, barley, rice, maize, oats, peas, beans, potatoes, soybeans and various fruits and vegetables were covered, not to mention all the pathogens involved. The proceedings are in press and are expected to be available in October 1977.

Future plans of the Section's programme include stronger efforts on evaluating the potential of induced mutations for the improvement of leguminous crop plants with particular emphasis on disease resistance. In this context, we would welcome information about ongoing or planned research projects concerned with resistance against economically important diseases, which are handicapped by a lack of suitable genetic resources.

We would also like to pay more attention to the potential genetic vulnerability of crop plants, in which one particular genetic factor is used commonly in many and/or widely distributed cultivars. The aim is, to provide the breeder with alternate genotypes to be used in cross breeding for obtaining the same plant characteristic. We expect co-operation of rice breeding institutes having dwarfing or semi-dwarfing mutants available, to test them for allelism with Taichung Native No. 1 or IR8, respectively, and transfer alternate dwarfing genes into suitable genetic backgrounds for easier use by rice breeders. Further steps will be a matter of discussion and agreement at a Seminar on Nuclear Techniques in Research for Improving Rice Production, planned to be held at Jakarta (Indonesia) 10-14 October, 1977. Interested parties may contact Dr. K. Mikaelsen of the Joint FAO/IAEA Division, Vienna.

The 4th Research Coordination Meeting on the Use of Nuclear Techniques for Seed Protein Improvement hald at Baden 27 March - 1 April 1977 was attended by 50 researchers.

Fourty scientific papers reviewed progress in mutation breeding for seed protein improvement in wheat, barley, rice, beans, peas, lentils, chickpeas, mungbeans, cowpeas, faba beans and soybeans. The bioenergetics of seed protein production was discussed in a separate session and there were also contributions dealing with computer-aided selection systems, new analytical techniques and nutritional evaluation of processed cereals. The results of an interlaboratory comparison of amino acid analytical methods were presented and discussed.

In addition to their strictly scientific persuites they reviewed the recommended analytical techniques for seed protein evaluation in plant breeding programmes, drafted recommendations for breeding and selection methods for seed protein improvement and considered what should happen when the current coordinated research programme ends in December 1978.

The proceedings of this meeting are currently being prepared for publication by IAEA.

RESEARCH NEWS

Exploitation of induced mutations in durum wheat: The breeding of the cultivar "Augusto"

Durum wheat cultivation in Italy moved in recent years from traditional areas to others, especially in the central region which was once devoted only to bread wheat cultivation. Factors promoting this spread were a chronic *durum* wheat deficit in Italy and other EEC countries, and the great improvement in the basic characteristics shown by recent *durum* cultivars. In particular, factors determining short straw were utilized in breeding programmes, leading to new lines almost completely resistant to lodging, and therefore capable of utilizing better fertility and water supplies.

Some of these lines, (Creso, Mida, Valgerardo, Valgiorgio, Valfiora, Valnova, Valsacco and others) show a drastic culm length reduction brought about by a Norin 10 factor. Others exhibit a shorter culm by induced mutations: sometimes (cvs. Castelporziano, Castelfusano, Casteldelmonte) these mutant lines were directly utilized as cultivars; in other cases (cv. Tito) the mutated factor was transferred by crossing.

The resulting lines exhibit a less marked culm length reduction than in the Norin 10 derivatives, but a more efficient natural weed control, combined with optimal lodging resistance.

With reference to the latter class of genotypes, data are reported, here, concerning a cultivar named Augusto[1]. It originated from the cross [(Castelporziano x Lakota) x Casteldelmonte], where the lines entering the combination were derived as shown in Table 1.

Table 1. Parentage of the new cultivar Augusto

Parental line	Pedigree
Castelporziano	mutant line from neutron irradiated cv. Cappelli
Lakota	cv. introduced from North Dakota (USA)
Casteldelmonte	mutant line from neutron irradiated cv. Grifoni

It can be recalled that from crossing Castelporziano x Lakota, the cv. Tito was obtained and released. It was characterized by very good performances and possessed interesting features, especially for northern regions in Italy. Therefore, Tito will be considered, here, as a meaningful point of reference in evaluating the characteristics of "Augusto"; so, in Table 2, data have been reported and compared, concerning the agronomic performances of "Augusto", "Tito" and "Casteldelmonte".

Table 2. Agronomic performances of the cvs. Augusto, Tito and Casteldelmonte[o]

Cultivar	Yield (qls/ha)	Test weight (kg/hl)	Yellow berry (%)	culm length (cm)	lodging index (+)	Heading date
Augusto	56.54	78.51	14.53	89.18	0.13	8.75/V
Tito	52.04	76.13	10.72	99.83	1.00	11.33/V
Casteldelmonte	50.68	79.51	11.98	94.14	3.68	6.58/V

(o) Averages over 9 locations in central Italy, during 6 years: from 1971 to 1976.

(+) 0 = no lodging; 5 = maximum lodging.

(1) Bred by D. Bagnara, G. Porreca and L.B. Rossi.

The data suggest a significant yield superiority of "Augusto" compared with "Tito" and "Casteldelmonte". Its test weight, is better than in "Tito". The length of culm in "Augusto" is possibly determined by an interaction between, or an additive effect of, the two short straw mutations contributed by "Castelporziano" and "Casteldelmonte". The former is inherited as a monogenic dominant, the latter as a monogenic recessive. However, while the presence of the "Castelproziano" short straw factor is confirmed in "Augusto" by the segregation patterns following crosses to "Augusto" itself, the same is not so clear for the "Casteldelmonte" factor; although the extend of the culm length decrease, 10 per cent comparing Augusto with Tito, suggests the presence of this factor as well. The lodging resistance of the new cultivar is better than of both "Casteldelmonte" and "Tito". The heading date of "Augusto" is earlier than "Tito", but later than "Casteldelmonte". A maturity time of "Casteldelmonte" is optimal for a durum wheat in central Italy, therefore the three days gain of "Augusto" in respect to "Tito" play an extremely important role in ensuring a safer final muturation.

"Augusto" is a spring habit wheat, moderately resistant to cool, resistant to local races of stem rust, but susceptible to leaf rust. It shows a good adaptation to the fertile soils of central Italy. In general, it can be concluded that "Augusto", although significantly better, is not strikingly superior to "Tito". Its value, as that of Tito, among the present Italian durum wheats lies in the fact that it belongs to a new class of cultivars carrying short straw induced mutant genes instead of the widely used Norin 10 factors. The short to medium culm height, accounts for their resistance to lodging, and permits a much more effective weed control.

Contributed by D. Bagnara and G. Porreca
Laboratory for Basic Food Crops, Casaccia Nuclear Centre
of the CNEN, Rome, Italy

Wheat mutants in Brazil

The wheat varieties IAC-5 and BH-1146 are very well accepted by the farmers in many states of Brazil and are recommended by several research institutes due to their generally good yield. However, the first variety shows insufficient resistance to lodging and the second one is susceptible to stem rust. Thus mutation breeding was initiated in 1974 to obtain shorter mutants in the first variety and mutants less susceptible to stem rust in the second.

Seeds of each variety were irradiated with gamma-rays (30, 40 and 50 krads) and the M_2 progenies were screened in the field. For stem rust resistance, inoculation was made utilizing a mixture of two races most common in the State of São Paulo. Mutants were selected in the M_2 and confirmed in the M_3.

For plant height reduction three mutant lines were isolated - TICENA-1, TICENA-2 and TICENA-3. Table 1. shows the characteristics of these mutant lines. TICENA-2 combines short straw with earliness.

For stem rust resistance one mutant line - TICENA-4, was selected. Its resistance is comparable to Sonora, a variety resistant to stem rust in Brazil.

Yield trials are being carried out.

Table 1. Characteristics of the mutants from IAC-5 variety of wheat

Name	Flowering (days)	Harvest (days)	Height (cm)
IAC-5 control	65	142	125
TICENA-1	63	139	80
TICENA-2	54	134	60
TICENA-3	61	139	70

Contributed by A. Tulmann Neto, A. Ando, A. Arruda Veiga, C.E.O. Camargo, J. Felicio and B.C. Barros, Centro de Energia Nuclear na Agricultura, Piracicaba, SP, Brasil and Instituto Agronômico de Campinas, Campinas, SP, Brasil

Mutant barley varieties in the U.K

The spring barley variety "Golden Promise" was developed from gamma irradiated "Maythorpe" and released in 1966. The variety has now been marketed in the U.K for ten years, where it has been very popular in the northern part of the country. It has occupied 70-80% of the barley crop in Scotland. In 1976 it was the highest sown variety, taking the U.K as a whole. Unfortunately, it is somewhat susceptible to mildew (*Erysiphe graminis*) and as such, the seed is normally treated with "Milstem" as routine procedure.

The spring barley "Midas" was developed from a cross with "Golden Promise" and released in 1970. It is also an erectoid type, which is very popular in the northern part of the country.

Both varieties have very stiff straw and very good ear retention, and both are readily accepted for malting purposes in Scotland. Some further improved lines have been developed from these varieties and are presently under official testing.

Two new cultivars "Goldspear" and "Goldmarker", developed by cross breeding with "Midas" have been approved officially in 1975/76 and will be released in spring 1978.

Contributed by Douglas P. Ruddick, Miln Marsters, Plant Breeding Station, Farndon, Chester (U.K)

Highly efficient spring barley varieties originating from the mutant cultivar "Diamant"

"Diamant" was the leading barley variety in all regions of Czechoslovakia in the early seventies. It was a mutant obtained after x-irradiation of "Valtický" cultivar, (see MBNL No.7 p.2) and showed good resistance to lodging and high yield under conditions of high soil fertility and sufficient rainfall. The malting and brewing quality of the grain was very good to improve some of the non-satisfactory traits. A breeding project of composite crossing commenced in 1963. Special attention was paid to ear productivity, mildew resistance, stem breaking after ripening, grain weight, proportion of grains bigger than 2.5 mm and maintenance of malting quality.

As a result, new barley varieties bred from the "Diamant" genotype are presently cultivated on Czechoslovak fields, having shorter straw, higher grain production and tillering capacity. In all these varieties the "Diamant" growing type predominates and is determined by two linked recessive genes segregating in 3.49 : 1.

The barley varieties "Ametyst", "Favorit" and "Hana" have been mentioned before (MBNL No.6). "Rapid" and "Atlas" are new varieties of the "Diamant series": released in 1976. Details are given in the list of mutant varieties in this issue. In cooperation with the Plant Breeding Institute in Hadmersleben (GDR) the two varieties "Trumpf" (1973) and "Nadja" (1975) were selected. (see MBNL No.9)

Recently, barley varieties of the "Diamant series" have been extended to 96 per cent of the cultivated acreage of the spring barley in Czechoslovakia. "Diamant" and its varieties increased the barley yields by twenty per cent compared with the former varieties. In the last three years the yields in barley regions reached 5.5 - 6.5 t/ha. Highest yields obtained on a large scale in barley productive regions were 8.0 t/ha. High yields are conditioned also by improved plant nutrition and soil cultivation. Nevertheless, the mutant cultivar "Diamant" was most decisive in obtaining these yield increases.

Contributed by J. Bouma, through the Czechoslovak Atomic Energy Commission, Prague, Czechoslovakia.

[1] BOUMA, J., New Variety of Spring Barley "Diamant" in Czechoslovakia. Šlechtitelská stanice Branišovice (1966).

[2] BOUMA, J. and MINAŘÍK, F., Results of breeding of malting barley in the Czech socialist republic. Šlechtitelská stanice Hrubčice (1972).

[3] MINAŘÍK, F. and BOUMA, J., Exploiting the World Collection and Induced Mutation in Breeding Summer Barley at the Breeding Station Hrubčice. Šlechtitelská stanice Hrubčice (1974).

Short stature, early maturing rice mutants

A cooperative rice breeding programme involving the United States Department of Agriculture and the University of California, Davis has developed short stature, early maturing mutants [1, 2]. One short stature, lodging resistant mutant selected from Calrose irradiated with 25 kr ^{60}Cobalt in 1969 has been released as Calrose 76 (see MBNL No.9 p.14). Preliminary studies indicate that the single recessive gene for short stature in Calrose 76 may be the same as the gene for short stature in Taichung Native 1 and IR8. The mutant gene in Calrose 76 is, however, in "japonica" germplasm which has cold resistance and good grain and cooking qualities, whereas the IR8 gene is in a tropical "indica" background.

Early maturing mutants have also been selected and breeding efforts are in progress to combine the short stature and early maturing mutants with the single gene for smooth hull from CS-M3 to produce further high yielding, lodging resistant, cold tolerant varieties with good milling and cooking qualities.

[1] RUTGERS, J.N. and PETERSON, M.L., California Agriculture 30 (1976) 4.

[2] RUTGERS, J.W., PETERSON, M.L., HU, C.H. and LEHMAN, W.F., Crop Sci. 16 (1976) 631.

Contributed by J.N. Rutgers, Agriculture Research Service, U.S. Department of Agriculture, Davis, California, U.S.A.

Mutagenesis in peas

To obtain mutants of practical importance, a project was started using chronic gamma rays, acute gamma rays, X-rays and the chemical mutagen EMS, on the 'Borek' pea variety of Czechoslovakia. 48 isodoses of chronic gamma radiations, 11 doses of acute gamma and X-radiations and 10 doses of EMS were applied. Besides several hundred chlorophyll mutants, 400 potentially useful mutants were identified in cooperation with the breeder of this variety, among 50,651 M_2 plants (see table). The mutants were taller in height (to facilitate mechanical harvesting), highly vigorous, better yielders and with improved protein quantity and quality.

	Chronic gamma rays	Acute gamma rays	X-ray	EMS treated	Total
Population studied	2256	35,179	9971	3245	50651
Chlorophyll mutants	75	123	205	275	678
Other mutants	193	172	16	19	400

From the results it is apparent that chronic gamma irradiation was more effective for the induction of potentially useful mutants. These mutants are at present under study on the fields of Experimental Station Cherveny Ujezd near Prague. The progenies of around 70% of the mutants maintained their improved traits.

Contributed by Soomro Mohammed Parial, Department of Genetics and Plant Breeding, University of Agriculture Prague, 16021, Suchdol, Czechoslovakia.

Attempts to induce mutants resistant or tolerant to golden mosaic virus in dry beans (*Phaseolus vulgaris* L.)

As there is no good source of resistance or high level of tolerance to "bean golden mosaic virus", research was initiated in 1975 to obtain mutants with such characteristics. Seeds from 3 varieties were treated with gamma-ray or EMS. The M_2 seeds were planted in pots which were kept in insectaries containing the vector (*Bemisia tabaci*) and plants with high symptoms of golden mosaic.

The screening was made and tolerant or resistant plants were selected individually and were again inoculated. Only the plants that showed tolerance or resistance in the second screening were saved. From over 50,000 M_2 seedlings of the 3 varieties only one mutant which derived from the treatment with 0.48% EMS (6 hours, 20°C) was selected from the variety Carioca. This mutant, named TMD-1, is distinct from the original variety, showing milder golden mosaic symptoms and a tendency to recover. It also shows morphological difference in leaf shape.

Mechanical inoculations at CIAT (Cali, Colombia), showed that the mutant had a good tolerance, and field tests carried out in Brazil, in an area of high natural occurrence of the disease, showed that the TMD-1 has the same degree of tolerance observed in greenhouse experiments. This tolerance is being transferred to two other commercial varieties in the São Paulo State.

Contributed by A. Tulmann Neto, A. Ando and A. Santos Costa
Centro de Energia Nuclear na Agricultura, Piracicaba, SP, Brazil
and Segão de Virologia, IAC, Campinas, SP, Brazil.

MDU.1, a new mutant chilli variety

Chilli is an important commercial crop in Tamil Nadu occupying an area of 87,500 hectares producing annually 1.25 lakh tons of dry chillies. Currently, a cosmopolitan strain K.1 and a regionally adapted strain K.2 are in cultivation. Gamma irradiation of K.1 strain in 1969-70 and subsequent study resulted in finding a number of viable mutants in M_2. Among them, a cluster flowering (CF.1) and two early maturing and high yielding (EMG 16 and EMG 22) mutants were found to be promising. These three mutant lines were evaluated for three years (1973-1976) in 25 multilocation trials using K.1 in the first two years and K.1 and K.2

in the third year as controls. The cluster flowering mutant line consistently yielded more than other mutants and the controls, and recorded an increased yield of 15 and 20 per cent over K.2 and K.1 strains, respectively. The cluster flowering mutant possesses a compact plant type, determinate growth habit with cluster flowering and fruiting, and an increased capsicine content. Based on the above desirable features the State Variety Release Committee of Tamil Nadu Government has approved the release of the cluster flowering mutant line as 'MDU.1' for general cultivation.

Contributed by R. Sethupathi Ramalingam
Department of Agricultural Botany, Agricultural College and Research Institute, Madurai, Tamil Nadu Agricultural University, India.

Induced mutations in mustard (*Brassica juncea*)

Five induced mutants in mustard (TM-1 to TM-5) which are of agronomic importance were reported earlier from this centre [1]. Six new strains of mustard with better yield potential are now available. The salient features of these stabilized new strains are given below. They are either direct mutants, or recombinants selected from hybridization between mutants or of mutants with other promising cultivars. The control varieties are characterized by open pod arrangement and black seeds.

TM-6 Tall, late with bold yellow seeds. A recombinant developed from crossing the induced yellow seeded mutant TM-1 x T59 (black bold seeded cultivar).

TM-7 A gamma ray induced mutant with large siliqua, black, bold seeds from the cv. *Varuna*.

TM-8 A recombinant developed from crossing the two induced mutants, TM-1 x TM-2; characterized by appressed, less shattering siliqua, compact plant type and yellow, bold seeds.

TM-9 An early, yellow, bold-seeded recombinant developed from the cross TM-1 x T59.

TM-10 A virescent mutant was obtained in the segregating F_2 population of the cross between a black, bold-seeded, cv. T59 x TM-1 (yellow seeded mutant) [1]. The leaves of this mutant are yellowish green with irregular green patches randomly distributed. The seeds are yellow; stem and the siliqua wall are ivory white and flowers light yellow in colour. Because of chlorophyll deficiency, the growth of the mutant was slow as compared with the parents. Studies of PMC have shown the chromosome number n = 18. A high incidence of cytological abnormalities, mostly bridges and non-disjunction of chromosomes was observed at the anaphase I of meiosis. Pollen abortion was also markedly high in the mutant as compared with the parents. The author is not aware of any report on virescent strains in mustard.

TM-11 A strain evolved from the cross of two appressed pod mutants TM-2 x TM-5; characterized by better pod set and compact plant type.

TM-12 A light yellow, bold-seeded recombinant developed from the hybrid seeds of the cross TM-1 x T59 treated with 100 kr gamma rays.

REFERENCE

[1] NAYAR, G.G., Mutation Breeding Newsletter, 3 (1974) 12.

Contributed by G.G. Nayar, Biology and Agriculture Division, Bhabha Atomic Research Centre, Trombay, Bombay, India).

Mutation breeding of some novel chemotypes in Japanese mint, *Mentha arvensis* L.

Mentha arvensis L. var. *piperascens* Holmes popularly known as Japanese mint is an important essential oil bearing species. Its oil yields a rich fraction of menthol besides some minor constituents like menthone, pulegone and methyl acetate whose concentration is low or may be in trace quantities only. At present the oil obtained from the plant is the principle source of menthol which finds extensive use in pharmaceutical, flavouring and allied industries.

The plant was introduced in India in 1952 and its cultivation is now spread to nearly ten thousand acres. Inspite of the fact that the crop is vegetatively propagated there has been a qualitative deterioration in the percentage of menthol in the oil over the years of cultivation. This low percentage of menthol in the oil is not separable by the standard processes, and therefore the oil became less valuable. A need therefore existed to breed new plant types better suitable for industrial use and more profitable to the farmers.

A programme of mutation breeding was initiated to obtain desirable chemotypes having increased percentages or menthol, pulegone, methyl acetate or menthone in the oil.

Dormant single bud suckers of the commercially used variety of Japanese mint, of the same age and size were subjected to various doses (1 to 10 kR) of X and gamma rays and immediately planted in the experimental fields. The populations so raised were analysed and by applying proper selection procedure (which included visual, olfactory as well as instrumental methods) some atypical chemotypic clones were isolated containing significantly altered constituents in the oil. A brief description of some major mutants isolated is given below:

1. Menthol types: Mutants which had significantly higher quantity of menthol in their oil. This group of five clones had menthol in the range of 80-90% as against 40-50% found in the parent clone. These included:

(i) Clones S-12 and S-18 with 90% menthol but herbage yield and oil content unaffected; (ii) Clones S-74 and S-115 with menthol content of about 80%, but herbage yield slightly reduced; (iii) Clone S-41 with menthol content of about 80% but herbage yield and oil content marginally reduced.

2. Pulegone types: Three clones were identified having pulegone in the range of 40-70% whereas in the parental clone it is found only in trace quantity. Clone S-63 had about 70% pulegone content in its oil. The yield of fresh herbage as well as the oil content remained unaffected. Another clone S-78 had a pulegone content of about 50%; the oil content also was slightly increased whereas yield of fresh herbage was not affected. Similarly, clone S-85 showed pulegone content of about 40%, fresh herbage yield showed an increase over the parental clone, the oil content remained unchanged.

3. Menthone type: In the parental clone the percentage of menthone does not exceed 15%, but among the mutant population a clone, S-8 was isolated having about 50% menthone in its oil. The herbage yield was reduced but the oil content was almost the same as the parental clone.

These studies show the usefulness of induced mutations in evolving various chemotypes in essential oil bearing plants. However, selection of parental material, radiation dose and, most important of all, the selection technique play a vital role in achieving success. The various mutant clones have been developed into cultivars and are being released soon for commercial cultivation.

Contributed by S.N. Kak and B.L. Kaul, Regional Research Laboratory, Jammu (Tawi) - 180001, India.

Mutant germ plasm

With MBNL No.8 we included a questionnaire aimed at assuring the continued interest of the recipients of our Newsletter. At the same time we asked you some questions about mutant stocks maintained and used in cross breeding. We have started to analyse the answers and we are grateful in this context to Mr. G. Scippa of the CNR Germ Plasm Laboratory at Bari (Italy) for his assistance. From the questionnaires returned to us so far we find that mutants of more than 90 plant species would be available. We imagine that it could be a useful service to our readers to provide upon request an address list of all institutions maintaining mutant germ plasm of a particular species. Of course, the value of such a service would increase if the information would be really comprehensive. We are depending upon those of you, who have not yet returned your answers. We assume that many of you would eventually wish to make use of our services. Your cooperation therefore would be appreciated.

A. Micke

FUTURE EVENTS OF INTEREST

1977

First International Symposium on Mungbean, 16 - 19 August 1977, Los Baños, Philippines.

European Society of Nuclear Methods in Agriculture (ESNA), 29 August - 2 September 1977, Uppsala, Sweden.

2nd FAO/IAEA Research Coordination Meeting on the Use of Aneuploids for Protein Improvement in Wheat, 26-30 September 1977, Vienna, Austria.

Regional FAO/IAEA Seminar on Improvement of Rice Production Through Research Using Nuclear Techniques, 10-14 October 1977, Jakarta, Indonesia.

1978

5th International Wheat Genetics Symposium, 23-28 February 1978, New Delhi, India.

FAO/SIDA Seminar on Improvement of the Nutritional Quality in Barley and Spring Wheat, March 1978, New Delhi, India.

EPPO Conference "Breakthroughs in resistance breeding" 20-23 June, Svalöv, Sweden.

3rd International Congress of Plant Pathology, 16-23 August 1978, München, FRG.

4th International Congress of Plant Tissue and Cell Culture, 20-25 August 1978, Calgary, Canada.

14th International Congress of Genetics, 21-30 August 1978, Moscow, USSR.

International FAO/IAEA/GSF Symposium on Seed Protein Improvement by Nuclear Techniques, 4-8 September 1978, Neuherberg, FRG.

Regional FAO/IAEA Seminar on the Utilization of Induced Mutations for Crop Improvement in Africa. (Date and location not yet determined)

6th International Cereal and Bread Congress, 16-22 September 1978, Winnipeg, Manitoba (Canada).

1979

6th International Congress of Radiation Research, 13-19 May 1979, Tokyo, Japan.

PRE-ANNOUNCEMENT

Symposium on induced mutations as research tool in plant science

Mutagenesis is generally taken as a means for producing genetic variability. Selected valuable mutants made their way to become commercial cultivars or are used in cross breeding. However, besides this direct contribution to crop plant improvement, induced mutations can contribute and have contributed indirectly to the improvement of crop plants and of plant production.

We are considering organizing an international symposium to review where and when induced mutations could be used beneficially as research tools, and to make this information available to the community of agronomists, geneticists, physiologists, pathologists, taxonomists and others dealing with cultivated plants.

The following subjects may be suggested for presentations and discussions at the symposium:

- mutants to study photosynthesis and translocation of photosynthetic products;
- mutants to study biochemical pathways;
- mutants to study "source"/"sink" relationships;
- mutants to study seed development;
- mutants to study regulation of endosperm composition;
- mutants to study regulation of photoperiodism;
- mutants to study relevance of canopy structure and light interception;
- mutants to study mechanisms of symbiosis;
- mutants to study host/parasite interactions and phenomena related to resistance;
- mutants to study the phenomenon of heterosis and hybrid vigour;
- mutants in evolutionary studies of crop plants;
- mutants to study genecology and population/environment interactions;
- mutants in research on male sterility and fertility restoration;
- mutants in aneuploid studies;
- mutants in taxonomy;
- mutants for *in vitro* studies;

We would appreciate comments by our readers to the plan to organize such a symposium and we would welcome suggestions for subjects to be included in the programme. Date and location of the symposium are not yet under consideration.

A. Micke

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 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 cross (mutant underlined)	Main improved attributes of variety
DURUM WHEAT			
Augusto	1976 Italy. D. Bagnara, G. Porreca, L.B. Rossi CNEN, Casaccia	[(Castelporziano x Lakota) x Casteldelmonte]	Increased yield, lodging resistance
BARLEY			
Rapid	1976 CSSR. Plant Breeding Station, Hrubčice	[(Voldagsen x Kneifl) x Diamant] x Denar	growing type like Diamant Higher grain production, resistant to mildew (genes Mla 6 and Mlg), early maturing
Atlas	1976 CSSR. Plant Breeding Station, Stupice	S55 (Stupice line) mutant x Diamant	growing type like Diamant Good tillering, resistant to lodging, mildew resistant (Mla 7) good yield and grain weight

Goldspear	1975 U.K D.P. Ruddick Miln Marsters Group Ltd. Plant Breeding Station Farndon, Chester	Midas x Lofa Abed	Erectoid growth habit from mutant parent of Midas, strong straw. Excellent head retention under unfavourable climatic conditions
Goldmarker	1976 U.K. D.P. Ruddick Miln Marsters Group Ltd. Plant Breeding Station Farndon, Chester	Midas x TCE 141	Erectoid growth habit from mutant parent of Midas Excellent head retention under unfavourable climatic conditions
<u>RICE</u>			
Kashmir Basmati	1977 Pakistan. M. Afsar Awan, G. Bari, A.A. Cheema, M. Akbar, Nuclear Institute of Agriculture and Biology Lyallpur	25 kR gamma rays, 1969 [Basmati 370]	Early maturity, suitable to be grown in Azad Kashmir at 2000-5000 feet altitude 30% higher yield than coarse varieties grown there
Fulgente	1973 Italy. A. Tinarelli Istituto sperimentale per la Cerealicoltura Vercelli	X-rays (25 kR) [Maratelli]	Blast resistant, high productivity
RD6	1977 Thailand. P. Khambanonda, A.A. Sarigabutr, S. Awakul, Rice Division, Department of Agriculture, Bangkok	Gamma rays (20 kR) 1965 [Khao Dawk Mali 105]	Glutinous endosperm and improved blast resistance

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 cross (mutant underlined)	Main improved attributes of variety
BEAN (Phaseolus vulgaris)			
Alfa	1972 CSSR. A. Hanišová, M. Haniš, V. Němec, H. Slavičková, I. Branžovský Plant Breeding Station, Stupice	EMS, 0.2%, 1966 [Black bean]	Improved seed and protein yield, earliness, resistance to Colletotrichum lindemuthianum, cooking quality; white seed colour
PEPPERMINT			
Murray Mitcham	1976 U.S.A. M.J. Murray, A.M. Todd Co. Kalamazoo, Mich., Purdue, Oregon and Washington Agricultural Experiment Station and Agricultural Research Service USDA	Neutrons [Mitcham]	Verticillium wilt resistant improved first year yield over Todd's Mitcham
CHILLI (Capsicum annuum L)			
MDU.1	1976 India, Tamil Nadu R. Sethupathi Ramalingam Department of Agricultural Botany Agricultural College & Research Institute, Madurai Tamil Nadu Agricultural University	Gamma rays, 1969-70 [K.1]	Compact plant type, higher yield and capsicine content

STREPTOCARPUS

Violetta	1977 FRG. F. Walther, Institute of Biotechnology, Nuclear Research Establishment Jülich; propagated by Fr. Griese, D-4800 Bielefeld 15	F_1 hybrid of two mutants (1974); mutants: 3.4 kR, leaves, 1972 (Constant Nymph)	Dark lilac coloured flowers, light green leaves
Kefora	"	"	Longer stems with higher number of smaller and dark-blue flowers of changed shape.
Mutara	"	"	Compact plant with shorter leaves and stems; flowers "papilionaceous", dark-blue

CORRECTIONS

BARLEY

AMETYST/HE 464b/	Czechoslovakia 1972 Plant Breeding Station Hrubčice	Voldagsen x [Domen x (Valtický x Hanácký jubiel.)] x Diamant	Growing type like Diamant, better grain production, stiff straw, mildew resistant (gene Mla 6), high weight of 1,000 grains, medium malting quality
HANA/HE 498/	Czechoslovakia 1973 Plant Breeding Station Hrubčice	Alsa x Diamant	Growing type like Diamant, better grain production, shorter stem, resistant to lodging, very good malting 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 cross (mutant underlined)	Main improved attributes of variety
FAVORIT/HE 481/	Czechoslovakia 1973 Plant Breeding Station Hrubčice	Diamant x Firl. Union	Growing type like Diamant, better grain production, short straw, resistant to lodging and straw breaking, mildew (Mlg), H. teres and R. secalis, very good malting quality
Blazer	1974 U.S.A. R.A. Nilan, C.E. Muir, A.J. Lejeune Wash. State University Pullman, Wash.	Traill x WA1038-WA6704-62 (Induced recombinant, thermal neutrons 1962)	6-row spring malting barley witn increased alpha amylase, due to linkage broken by irradiation. Improved shatter resistance, straw strength and yield (in 1976 60 000 acres) in Wash. and Idaho)
Boyer	1974 U.S.A. C.E. Muir, R.A. Nilan, A.J. Lejeune Wash. State University Pullman, Wash.	Luther x WA Sel. 1255-60	6-row winter feed barley earlier maturing, higher yielding, more winter hardy, larger grain than Luther. Maintained from mutant high yield, straw strength, short straw

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

Induced Mutations in Cross-Breeding. Proceedings of an Advisory Group, Vienna (Austria) 1975
IAEA, STI/PUB/447, US$17.00, Vienna 1976.

Improvement of Vegetatively Propagated Plants and Tree Crops through Induced Mutations. Proceedings of a Research Coordination Meeting, Wageningen (Netherlands) 1976.
IAEA-194, Vienna 1976.
(Available as microfiche copy on prepayment of US$0.65).

Tracer Manual on Crops and Soils. Technical Reports Series No. 171
IAEA, 1976, STI/DOC/10/171, US$17.00.

Manual on Mutation Breeding 2nd Edition.
IAEA, Vienna 1977, STI/DOC/10/119, US$20.00.

WANTED

Plant breeding expert (rice) for mutation breeding project at Institute of Nuclear Agriculture, Mymensingh (Bangladesh) up to 3 months (BAN/5/03/03).

Plant breeding expert (grain legumes) for mutation breeding project at Institute of Nuclear Agriculture Mymensingh (Bangladesh) up to 3 months (BAN/5/03/05).

Analytical chemist experienced in screening plant populations for protein, starch, oil and anorganic compounds in seeds for lecturing 1 month at Institute of Nuclear Agriculture Mymensingh (Bangladesh) (BAN/5/03/20).

Radiobiologist with experience in plant breeding for the Nuclear Research Centre in Tajura (Libya) up to 2 months (LIB/5C/02).

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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