



# Mutation Breeding Newsletter

Joint FAO/IAEA Division of Atomic Energy in Food and Agriculture

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## INTRODUCTION

Dear Colleague,

The numerous cooperators of the Joint FAO/IAEA Division of Atomic Energy in Food and Agriculture in the field of plant breeding and genetics have for years requested the Division to circulate a Newsletter. The Newsletter has been discussed at several panel and coordination meetings. As you all know, we have dragged our feet, mostly because of lack of staff in the Plant Breeding and Genetics Section. We now feel that we cannot hesitate any longer and have decided not to wait until we could turn out a fancy Newsletter but to start by issuing an informal one, one which we hope -- with your cooperation -- may grow into a more substantial document.

The purpose of the Newsletter is chiefly to bring news of progress in the field of mutation breeding, significant events, the activities and programme of the Division, and, hopefully, later brief abstracts of unpublished results or very recently published results, in order to speed up information exchange. We therefore urge you to send in such contributions and any other newsworthy items before 1 July 1972 to Dr. Björn Sigurbjörnsson, Deputy Director, Joint FAO/IAEA Division of Atomic Energy in Food and Agriculture, IAEA, 1011 Vienna, Austria.

He and his secretary, Margret Weiner, have agreed to collect, arrange and put out the Newsletter for the time being, with assistance from the staff of the Plant Breeding and Genetics Section. The frequency and the quality of the Newsletter will depend on the information received but we plan to circulate it twice a year.

### Staff of the Plant Breeding and Genetics Section of the Joint FAO/IAEA Division

Section Head: Dr. Alexander Micke (Germany)  
since March 1969

Section Staff: Dr. Robert Luse (USA)  
since July 1968

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Dr. Knut Mikaelson (Norway)  
since July 1965

Laboratory Staff: Dr. Sung C. Hsieh (Rep. of China)  
since October 1970

Dr. Gunnar Jansson (Sweden)  
since March 1971

Dr. Helmut Brunner (Austria)  
since April 1961

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Division Director: Dr. Maurice Fried (USA)  
since December 1960

Deputy Director: Dr. Björn Sigurbjörnsson (Iceland)  
since October 1963

Activities of the Plant Breeding and Genetics Section during the period 1969/71  
and future plans.

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The section has continued its activities to promote and coordinate research on the production and utilization of mutations in crop plants.

The coordinated programme of research on the use of induced mutations for rice improvement completed its fifth year. The achievements were reviewed at a coordination meeting in New Delhi in September 1969 and were published in the IAEA Technical Reports series under the title "Rice Breeding with Induced Mutations III". Among the positive results reported by the cooperators are improvements in seed protein quantity and quality, shortening of straw, early maturity, better grain quality and higher resistance to bacterial leaf blight and blast. A further coordination meeting was held in the Philippines in September 1971 and the possibility of continuing the programme is being explored. It is our intention to provide further support and guidance to projects under way, as far as funds can be made available.

The coordinated programme of research on the use of neutrons in seed irradiation, which was started in 1966, sought to encourage the use of reactors in both applied and theoretical neutron radiobiology, by developing standardized neutron irradiation facilities, by introducing simple dosimetry, and by providing models for standard reporting of work done. As a result of the research programme, seven standard neutron irradiation facilities (SNIF) have been installed in pool-type reactors in various countries. Plant breeders in the Far East are now using SNIFs to induce mutations in crops like rice and soybeans. With these achievements the programme has fulfilled its goal and has been terminated. Results are published in the IAEA Technical Reports Series.

As is well known, there exists an urgent need to provide food with better nutritional quality to the expanding world population. Of particular interest is the development of high-quality protein sources. One of the best solutions to the problem would be that of developing crop varieties having improved protein, by which is meant either higher protein content or higher content of essential amino acids (such as lysine), or both. A coordinated research programme on the application of nuclear techniques to improve crop protein was started in 1969 and is aimed at making a significant contribution to crop protein improvement through mutation induction and through the development of better analytical methods to screen plant populations for types with improved protein characters. Due to substantial support from the Federal Republic of Germany, this programme has been enlarged and intensified since 1970. Two

scientific meetings have been organized in relation to the subject, a panel meeting in Röstanga, Sweden, in 1968, and a Symposium in Vienna in 1970. The proceedings were published by the IAEA. The first coordination meeting of cooperators which was scheduled for December 1971 in New Delhi, had to be formally cancelled because of local difficulties. It will now be held in Munich in June 1972.

To assure further progress in mutation breeding, we continued our attempts to stimulate the development of improved methods and techniques by our coordinated research programme on production and use of induced mutations in plant breeding. Experts from 14 countries volunteered to cooperate under the framework of this programme and made their knowledge and expertise available. As most valuable result of this programme, the "Manual on Mutation Breeding" was compiled and published. The five-year programme was terminated in 1971, but after a review of the achievements, a new programme with emphasis on mutation breeding methodology will be implemented. Two panels were held in Vienna in the five-year period, the proceedings of which were published by the IAEA. The group met also in Pullman in 1969, following the Symposium on Induced Mutations in Plants. In November 1970, the group joined in a meeting with a large number of Latin American geneticists and plant breeders in Buenos Aires to discuss prospects and achievements of mutation techniques in Latin America with particular emphasis on crop improvement. The proceedings have been published in the IAEA Panel Proceedings Series under the title "Induced Mutations and Plant Improvement".

Various actions concerned with the evaluation of promising mutant material under different environmental conditions were also continued. Detailed reports on the International Mutant Durum Wheat Trials, organized jointly by FAO, IAEA and the Italian Nuclear Energy Commission (CNEN), were published in 1969. The trials are continued including new strains and cultivars, and another review of the results is planned.

The initiative of the section to develop a computerized storage and retrieval system on induced mutant assortments was channelled into a larger project involving the FAO Crop Ecology and Genetics Resources Unit and other national and international institutions. The attempt to coordinate these plans with all institutions concerned and to develop a worldwide standardized system for recording and storage of data met many additional problems which caused a regrettable delay in this project. However, it is hoped that the initiative can be started again on a more limited scale.

Worldwide concern over the frequent and hazardous epidemics of plant diseases causing critical crop losses and over the danger of fungicide residues in food and environment created renewed interest in breeding crop varieties with resistance to diseases. In order to guide this section with regard to a possible contribution to solving or diminishing the problem, an expert panel on mutation breeding for disease resistance was convened in October 1970. As a result of this meeting, it was recommended to provide more and better training to plant breeders in plant pathology and to plant pathologists in plant breeding. It was also strongly recommended to implement a research programme on breeding for disease resistance with inclusion of induced mutation techniques. We have started in the meantime such a programme and have already invited qualified institutions in various parts of the world to join in the programme. A first research coordination meeting was held in December 1971 in Nairobi.

Future activities of the Plant Breeding and Genetics Section will be concerned more specifically with mutation breeding of vegetatively propagated and perennial crops, with problems of radiation-induced changes in reproductive mechanisms (sterility, incompatibility, etc.) and its use for plant breeding, and with new developments in using tissue cultures for mutation breeding. We would appreciate any information about research projects in these subjects and related fields.

List of Publications of the Plant Breeding and Genetics Section

<u>Year of Issue</u>	<u>Title of Publication</u>	<u>Price</u>
1961	Radiation in Agricultural Research and Practice (STI/PUB/15/10)	U.S.\$ 1.00
1961	Effects of Ionizing Radiations on Seeds (STI/PUB/13)	U.S.\$ 9.50
1965	The Use of Induced Mutations in Plant Breeding (Pergamon Press, London)	Lb. 15.--
1966	Effects of Low Doses of Radiation in Crop Plants (STI/DOC/10/64)	U.S.\$ 1.50
1966	Mutations in Plant Breeding (STI/PUB/129)	U.S.\$ 6.00
1967	Neutron Irradiation of Seeds (STI/DOC/10/76)	U.S.\$ 2.50
1968	Mutations in Plant Breeding II (STI/PUB/182)	U.S.\$ 6.50
1968	Rice Breeding with Induced Mutations (STI/DOC/10/86)	U.S.\$ 3.50
1968	Neutron Irradiation of Seeds II (STI/DOC/10/92)	U.S.\$ 5.00
1969	New Approaches to Breeding for Improved Plant Protein (STI/PUB/212)	U.S.\$ 5.00
1969	Induced Mutations in Plants (STI/PUB/231)	U.S.\$20.00
1969	Results and Statistical Analyses of International Mutant Durum Wheat Trials 1965-68, Parts I and II	---
1970	Manual on Mutation Breeding (STI/DOC/10/119)	U.S.\$ 6.00
1970	Rice Breeding with Induced Mutations II (STI/DOC/10/102)	U.S.\$ 4.00
1970	Improving Plant Protein by Nuclear Techniques (STI/PUB/258)	U.S.\$12.00
1970	Nuclear Techniques for Increased Food Production (FAO Basic Study No. 22)	U.S.\$ 1.25
1971	Mutation Breeding for Disease Resistance (STI/PUB/271)	U.S.\$ 6.00
1971	Rice Breeding with Induced Mutations III (STI/DOC/10/131)	U.S.\$ 5.00
1971	Nuclear Techniques and the Green Revolution (INFCIRC/146/Add.I)	---
1972	Induced Mutations and Plant Improvement (STI/PUB/297)	U.S.\$16.00

List of Meetings and Training Courses organized by the Plant Breeding and Genetics  
Section 1969 - 1971

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1. Consultants' Meeting on International Standardization of Crop Research Data (Vienna, 11-15 April 1969)
2. First International Training Course on the Use of Radiation and other Mutagen Treatments for Crop Improvement (Casaccia, Italy, 12 May - 20 June 1969)
3. Symposium on the Nature, Induction and Utilization of Mutations in Plants (Pullman, Washington, U.S.A., 14-18 July 1969)
4. Research Coordination Meeting on Production and Use of Induced Mutations in Plant Breeding (Pullman, Washington, U.S.A., 19 July 1969)
5. Research Coordination Meeting on the Use of Induced Mutations for Rice Improvement (New Delhi, India, 20-25 September 1969)
6. Research Coordination Meeting on Neutron Irradiation of Seeds (Knoxville, Tennessee, U.S.A., 17-20 November 1969)
7. Symposium on Plant Protein Resources: Their Improvement through the Application of Nuclear Techniques (Vienna, 8-12 June 1970)
8. Research Coordination Meeting on the Use of Nuclear Techniques for Seed Protein Improvement (Vienna, 13 June 1970)
9. Panel on Mutation Breeding for Disease Resistance (Vienna, 12-16 October 1970)
10. Latin American Study Group Meeting on Induced Mutations and Plant Improvement (Buenos Aires, Argentina, 16-20 November 1970)
11. Research Coordination Meeting on Production and Use of Induced Mutations in Plant Breeding (Buenos Aires, Argentina, 21 November 1970)
12. Second International Training Course on the Use of Radiation and other Mutagen Treatments for Crop Improvement (Lund and Svalöf, Sweden, and Risø, Denmark, 1 June - 12 July 1971)
13. Research Coordination Meeting on the Use of Induced Mutations for Rice Improvement (Los Baños, Philippines, 13-17 September 1971)
14. Regional Training Course on the Application of Nuclear Techniques in Plant Biochemistry, with special reference to Protein (Bogotá, Colombia, 2 November - 3 December 1971)
15. Research Coordination Meeting on Induced Mutations for Disease Resistance in Crop Plants (Nairobi, Kenya, 6-11 December 1971)

## Future Events of Interest

<u>Date</u>	<u>Place</u>	<u>Title of Meeting</u>
26-30 June 1972	Neuherberg near Munich, F.R. Germany	FAO/IAEA Research Coordination Meeting on the Use of Nuclear Techniques for Seed Protein Im- provement
3 Jul - 11 Aug 1972	U.S.S.R.	Study Tour on the Use of Isotopes and Radiation in Genetics and Plant Breeding
11-15 Sep 1972	Vienna, Austria	FAO/IAEA Panel on Mutation Breed- ing of Vegetatively Propagated and Perennial Crops
2-7 Oct 1972	Bari, Italy	FAO/IAEA/EUCARPIA Meeting on Mutations and Polyploidy
9-11 Oct 1972	Bari, Italy	FAO/IAEA Research Coordination Meeting on Improvement of Mu- tation Breeding Techniques

### LIST OF MUTANT VARIETIES

Attached to this issue of the Mutation Newsletter you will find a reprint from the publication "Induced Mutations and Plant Improvement" (IAEA, 1972), which contains a list of released or approved varieties produced with induced mutations or having induced mutations in their background (based on information received by the Joint FAO/IAEA Division of Atomic Energy in Food and Agriculture as of 1 September 1971).

The Plant Breeding and Genetics Section is frequently asked by governments, scientists and farmers from all over the world for information about the success of varieties produced by induced mutations. You are therefore kindly requested to report to the Section any such released mutant varieties that you know of. Of particular importance, beside the data mentioned in the list, is information about the amount of certified seeds produced and the acreage of a particular mutant variety grown by farmers.

Below are some more mutant varieties reported after publication of the list.

Name of new variety	Place and date of release (or approval) and name of principal worker and in- stitute	Kind and date of mutagenic treatment/ [Parent variety]	main improved attributes of variety
<u>RICE</u>			
BPI-121-407	Philippines, 1971 (approved) E. Cada, Maligaya Rice Res. and Training Center	Seeds treated with gamma rays and mixed neutrons (1965) [BPI-121]	Early, short, stiff-strawed, high tillering, high yielding. Good di- sease resistance, moderately resistant to bacterial leaf blight.
<u>ONION</u>			
Compas	Netherlands, 1970 (approved) J. van Kampen, Vegetable Res. Sta. Alkmaar, and Foundation Dutch Onion-Federation, Middelharnis	Seed treatment, 15.000 R (1960) [Grobol]	Very firm, long-keeping variety. Globe type with brownish/yellow skin. Three or more dry outer leaves and therefore very suitable for mechanical handling. Very uniform.
<u>APPLF</u>			
McIntosh 8F-2-32	Canada, 1970 K.O. Lapins, Canada Dept. of Agric. Res.Sta. Summerland, B.C.	Shoots treated with gamma rays [McIntosh ]	Improved skin color, resistance against <u>Podospaera leucotricha</u> , <u>Venturia inaequalis</u> .
<u>CHERRY</u>			
Early Blenheim	Canada, 1970 K.O. Lapins, Canada Dept. of Agric. Res.Sta. Summerland, B.C.	Shoots treated with thermal neutrons [Blenheim]	Matures one week earlier than parent. Annual yield, pollen self-incompat- ibility.

List of Experts and Consultants employed in connection with the programme of the  
Plant Breeding and Genetics Section

Name	Home Country	Duty Station	Year
S. Borojevic	Yugoslavia	Cairo, Egypt	1969/70
T. Hermelin	Sweden	Tel Amara, Lebanon	1969
G. Ahnström	Sweden	New Delhi, India	1969
C.F. Konzak	U.S.A.	Vienna	1969
T.P. Bogyo	U.S.A.	Vienna	1969
G. Ahnström	Sweden	Vienna	1969
A. Bozzini	Italy	Eskisehir, Turkey	1969
T. Kawai	Japan	Bangkok, Thailand	1969/71
O.P. Kamra	Canada	Vienna	1969/70
O.P. Kamra	Canada	Djakarta, Indonesia	1970
R. McKenzie	Canada	Vienna	1970/71
H.H. Smith	U.S.A.	Vienna	1970
A.H. Sparrow	U.S.A.	Vienna	1970
J. Brewbaker	U.S.A.	Manila, Philippines	1970
G. Jansson	Sweden	New Delhi, India	1970/71
J. Simon	Hungary	Gyogon, Burma	1971
G. Kimber	United Kingdom	New Delhi, India	1970/71
A. Gustafsson	Sweden	Vienna	1971
W. Gottschalk	F.R. Germany	Bombay, India	1971
P. Perea-Lercy	France	Tel Aviv, Israel	1971
G. v. Ehrenstein	F.R. Germany	Vienna and Zemun, Yugosl.	1971
W. Proctor	U.S.A.	Vienna	1971
L. Munck	Sweden	New Delhi, India	1971
M.S. Haq	Bangla Desh	Gyogon, Burma	1972

Note: There are frequently open positions for expert posts in the field of mutation research or mutation breeding, with assignments between three and twelve months. Anyone interested in such an assignment might inform the Joint FAO/IAEA Division.

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