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ESNA

EUROPEAN SOCIETY
OF NUCLEAR METHODS IN AGRICULTURE

XIXth ANNUAL MEETING

29. Aug. – 2. Sept. 1988, VIENNA
AUSTRIA

FINAL PROGRAMME
AND
BOOK OF ABSTRACTS

E S N A

EUROPEAN SOCIETY OF NUCLEAR METHODS IN AGRICULTURE

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	Dr. J.D. Dargie	FAO/IAEA
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Organizing Institutions

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Austrian Research Centre Seibersdorf
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A-2444 Seibersdorf

Joint FAO/IAEA Division
International Atomic Energy Agency
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Bundesministerium für Wissenschaft
und Forschung

Bundesministerium für Land-
und Forstwirtschaft

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ESNA Secretary

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University of Agriculture, Brno
Zemedelská 1
613 00 Brno, CSSR

Organization

Location of the meeting

International Atomic Energy Agency (IAEA)
Vienna International Centre (VIC)
Wagramerstraße 5
A-1400 Wien, Austria

Congress bureau and registration

until Aug. 26th, 1988
Institut für Landwirtschaft
Österreichisches Forschungszentrum Seibersdorf Ges.m.b.H.
A-2444 Seibersdorf, Austria
Phone 02254/80-3600 or 3601

from Aug. 29th to Sep. 2nd, 1988
International Atomic Energy Agency
Vienna International Centre (VIC)
Wagramerstraße 5
A-1400 Wien, Austria
Phone 0222/2360-1610 or 1310

The congress bureau will be open from
Monday Aug. 29th to Friday Sep. 2nd
8.00 a.m. - 5.00 p.m.

Language

English

Financial

ESNA annual membership fee 1988	US $ 15,--
Participation fee for ESNA members	US $ 25,--
Participation fee for non-ESNA members ...	US $ 60,--
Excursion fee	US $ 12,--

To be paid at the bank of the VIC.

Accomodation

Hotel Wandl, Petersplatz 9, A-1010 Wien
Phone 0222/534 55-0

Various hotels in the city

Kolpinghaus Alsergrund (student dormitory)
Althanstraße 51
1090 Wien
Phone 0222/34 83 42

Kolpinghaus Favoriten (student dormitory)
Sonnwendgasse 22
1100 Wien
Phone 0222/604 24 51

Kolpinghaus Gumpendorf (student dormitory)
Gumpendorferstraße 39
1060 Wien
Phone 0222/587 56 31

Kolpinghaus Meidling (student dormitory)
Bendelgasse 10-12
1120 Wien
Phone 0222/83 54 87

Meals

Lunch is being offered at the Restaurant and in the Cafeteria of the IAEA
Lunch time: 13.00-14.00 h

Dinner has to be arranged on a private basis.

Coffee and tea will be served free of charge to all participants during coffee breaks.

Transportation in Vienna

Metro U1 stops in front of the VIC.

Cultural Programme

Monday, Aug. 29th, 1988, 18.00 h

Reception:
by invitation of the International Atomic Energy Agency and the Austrian Research Centre in the restaurant of the IAEA. Buffet dinner and drinks will be offered.

Wednesday, Aug. 31st, 1988

Excursion Programme:

9.00	Buses leave from the VIC, the Kolpinghaus Alsergrund, the Kolpinghaus Favoriten, the Kolpinghaus Gumpendorf and the Kolpinghaus Meidling. Departure for Seibersdorf. Visit of the Austrian Research Centre and the Laboratories of the FAO/IAEA
13.00	Lunch by the invitation of the ARCS
14.00	Departure Visit of Haydn's birthplace at Rohrau Visit of the Art Gallery Harrach at Neuhof/Rohrau
16.30-17.30	Wine tasting at the Winzergenossenschaft Donnerskirchen by invitation of the ARCS. Visit of the picturesque city of Rust
18.30	Departure for Eisenstadt
19.00	Reception by the Prime Minister of the Federal State of Burgenland, Mr. Hans Sipötz, at Schloß Esterhazy
21.30	Departure for Vienna

Thursday, Sep. 1st, 1988, 20.00 h

Reception:
By invitation of the Major of Vienna, Prof. Dr. H. Zilk, at the City Hall (Wappensaal)

Ladies Programme:

Use information material and organize individually.

Scientific Programme

Opening Session

Monday, Aug. 29th, 1988, Board room, building C, 4th floor 10.00 h

Opening Remarks

Univ.Prof. Dr. P. Koss, ARCS
President of the XIXth ESNA Annual Meeting

Welcome Addresses

Ministerialrat Dipl.-Ing. O. Zellhofer
On behalf of the Minister
for Science and Technology

Ministerialrat Dipl.-Ing. E. Rossoll
On behalf of the Minister
for Agriculture and Forestry

Dr. H. Blix
Director General of the IAEA

Dr. D. de Zeeuw
Chairman of ESNA

Break 10.30-11.00 h

Plenary Lecture 11.00-13.00 h

Transformation of organic manures in soil as traced by radio carbon.
Dr. H.E. Oberländer
Federal Institute for Agricultural Chemistry, Vienna

The programme of the Joint FAO/IAEA Division.
Dr. B. Sigurbjörnsson
IAEA, Vienna

Session of the Working Groups

TIME TABLE

		BUILDING A		BUILDING C				
FLOOR		07	27	04		07		
ROOM		CONF.	CONF.	BOARD-R	53	C4	C5	C6
MO	M	-	-	OPENING	-	-	-	-
	A	WG3 S1	WG2 S1	WG1/12 S1	-	WG7 S1	WG5 S1+2	-
TU	M	WG3 S2	WG2 S2	WG1/12 S2	WG9/10 S1	WG7 S2	WG5 S2+3	WG4 S1
	A	WG3 S3	WG11 S1	WG1/12 S3	WG9/10 S2	WG7 S2	WG5 S4	WG4 S2+3
TH	M	-	WG11 S2	WG1/12 S4	WG9/10 S3+4	WG7/8 S3+4	WG5 S5	-
	A	-	WG11/6 S3	WG1/9 S5+6	-	WG7 REST	WG5 REST	-
Fr	M	-	-	CLOSING	-	-	-	-

LECTURES: M: 9.00 - 10.30
11.00 - 13.00
A: 14.00 - 15.30
16.00 - 18.00

COFFEE: 10.30 - 11.00
15.30 - 16.00

LUNCH: 13.00 - 14.00

WORKING GROUP 1 (FOOD IRRADIATION)
+ 12 (WASTE IRRADIATION)
Chairman: J. Farkas

1. Session:

Loaharanu, P. (Joint FAO/IAEA Division, Vienna): WORLDWIDE STATUS OF FOOD IRRADIATION AND THE FAO/IAEA/WHO/ITC-UNCTAD/GATT INTERNATIONAL CONFERENCE ON THE ACCEPTANCE, CONTROL OF AND TRADE IN IRRADIATED FOOD.

Van Kooij, J. G. (Joint FAO/IAEA Division, Vienna): STATUS OF THE REGIONAL FOOD IRRADIATION PROJECT FOR DEVELOPING COUNTRIES OF MIDDLE EAST AND EUROPE.

Status of food irradiation in participants countries:

Belgium (J.-P. Lacroix)
Canada (P. Kundstadt)
Czechoslovakia (T. Hanis)
F.R.G. (L. Heide)
France (P. Boisseau)
G.D.R. (A. Jantz)
Hungary (I. Kiss)
Israel (M. Lapidot)
Netherlands (D. Is. Langerak)
Poland (J. Szczawinski)
United Kingdom (W.R. Bradford)
U.S.A. (J.S. Sivinski)

2. Session:

Kalman B., Styevko M. (Hungary): COMMERCIAL SCALE FOOD IRRADIATION IN HUNGARY.

Lapidot M. (Israel): LOW COST SMALL-SCALE COMMERCIAL FOOD IRRADIATION FACILITY.

Kundstadt P. (Canada): TRANSPORT AND DISPOSAL OF COBALT-60 INDUSTRIAL IRRADIATION SOURCES.

Sivinski J.S. (U.S.A): THE ROLE OF LINEAR ACCELERATORS IN THE U.S. FOOD IRRADIATION PROGRAMS.

Vacek K. (Czechoslovakia): CONTEMPORARY PROGRESS AND PERSPECTIVES OF WASTE IRRADIATION PROCESSING.

Sivinski J.S. (U.S.A.): RENEWED INTEREST IN MUNICIPAL SLUDGE IRRADIATION IN THE UNITED STATES.

Mukherjee R. (IAEA): AN UP-TO-DATE REPORT ON THE AGENCY'S CRP ACTIVITIES ON WASTE IRRADIATION.

Vacek K., Pastuszek F., Sedlacek M. (Czechoslovakia): RADIATION PROCESSING APPLICATIONS IN THE CZECHOSLOVAK WATER TREATMENT TECHNOLOGIES.

Alwakdi O.M., Beczner J., Szoke P. and Pal I. (Hungary): STORAGE EXPERIMENT WITH IRRADIATED POTATOES.

Kubin K. (Czechoslovakia): HEALTHY POTATO TUBERS - CONDITION NECESSARY FOR SUCCESSFUL RETARDATION IRRADIATION.

Gajewski M. (Poland): EFFECTS OF IRRADIATION IN RELATION TO TERMS OF APPLICATION AND STORAGE CONDITIONS ON MARKETABILITY OF ONIONS AFTER LONG TERM STORAGE.

3. Session:

Gajewski M. (Poland): MARKET TESTS WITH IRRADIATED ONIONS IN POLAND IN 1984 - 1988.

Boisseau P. (France): A NEW RESEARCH PROGRAM ON EFFECTS OF GAMMA RAYS ON PLANT CELLS.

Langerak D.Is., El-Buzedi M., Wolters Th.C., Goa D. (Netherlands): EFFECT OF HEAT, IRRADIATION, PACKAGING AND THEIR COMBINATION ON THE KEEPING QUALITY OF TOMATOES ARTIFICIALLY INFECTED WITH BOTRYTIS CINEREA.

Kovacs E., Keresztes A. (Hungary): IDENTIFICATION OF IRRADIATED FRESH FRUITS.

Boisseau P. (France): ELECTRON SPIN RESONANCE IDENTIFICATION OF IRRADIATED STRAWBERRIES.

Zabielski J., Fiszer W. (Poland): EFFECT OF GAMMA IRRADIATION ON FUNCTIONAL PROPERTIES OF BROILER MEAT.

Zabielski J. (Poland): EFFECT OF GAMMA IRRADIATION ON THE FORMATION OF CHOLESTEROL OXIDATION PRODUCTS IN MEAT.

Szczawinski J., Szulc M. (Poland): THE EFFECT OF IRRADIATION ON ANTIBACTERIAL EFFICACY OF SODIUM NITRITE IN CURED MEAT.

Farkas J., Andrassy E. (Hungary): COMBINED EFFECT OF IONIZING RADIATON PLUS HEAT TREATMENT ON SPORES OF CLOSTRIDIUM SPOROGENES IN CANNED LUNCHEON MEAT.

Szczawinska M. (Poland): PROSPECTS FOR ELIMINATION OF SALMONELLAE FROM POULTRY MEAT BY IRRADIATION IN POLAND.

Lacroix J.-P. (Belgium): IRRADIATION OF FISH: EXPERIMENTS AT I.R.E.

4. Session:

Vacek K., Rejholec J. (Czechoslovakia): REMOVING OF SALMONELLA CONTAMINATION IN FISH FLOUR BY MEANS OF IONIZING RADIATION.

Kiss I., Hajos Gy., Halasz A. (Hungary): PROPERTIES OF IRRADIATED EGG-WHITE.

Jantz A., Funke D. (G.D.R.): SOME INVESTIGATIONS OF GAMMA-IRRADIATED WHOLE EGG POWDER.

Kispeter J., Beczner J., Borbely-Kiss I., Horvath L., Kiss L., Rozsa Zs. (Hungary): THE EFFECT OF IONIZING RADIATION ON SOME PHYSICAL PROPERTIES OF LACTALBUMIN.

Hanis I., Kozakova B., Mnukova J., Pesek M., Klir P. (Czechoslovakia): EFFECTS OF DOSE RATE ON REDUCTION OF NATURAL MICROFLORA AND SOME NUTRIENTS IN CO-60 IRRADIATED DIETETIC CEREAL MIXTURES.

Beczner J., Kiss I. (Hungary): IDENTIFICATION OF IRRADIATED PRODUCTS BY CHEMILUMINESCENCE.

Heide L., Bögl K.W. (F.R.G.): IDENTIFICATION OF IRRADIATED SPICES AND CONDIMENTS WITH LUMINESCENCE MEASUREMENTS: A EUROPEAN INTERCOMPARISON.

Bachmann S., Novotny A., Gambus I., Witkowski S. (Poland): DEPENDENCE OF THE RETROGRADATION DEGREE OF GAMMA CO-60 IRRADIATED TRITICALE STARCHES ON THEIR PHYSICO-CHEMICAL PROPERTIES.

Farkas J., Sharif M.M., Koncz A. (Hungary): FURTHER EXPERIMENTS ON THE DETECTION OF IRRADIATION OF DRY FOOD INGREDIENTS BASED ON STARCH DEGRADATION.

Bradford W.R. (U.K.): ASPECTS OF IMPLEMENTATION OF FOOD IRRADIATION AND IDENTIFICATION OF IRRADIATED PRODUCTS.

Zabielski J., Uchman W. (Poland): BINDING OF METHYLENE BLUE BY NATURAL ACTOMYOSIN GEL IRRADIATED WITH 16 KGY.

5. Session:

Jointly with Session 5 of WG 9/10

6. Session:

General discussion (Moderator: P. Loaharanu)

- Harmonization of regulations/legistations in food irradiation.
- Process control of food irradiation.
- Consumer acceptance of irradiated food.

WORKING GROUP 2 (Radiation induced stimulation effects in living organisms)
Chairman: J. Simon

1. Session:

Cholakov D. and Kartalov P. (Bulgaria): THE EFFECT OF PRESOWING LASER IRRADIATION OF SEEDS UPON THE PRODUCTIVITY OF CUCUMBERS GROWN IN UNHEATED PLASTIC GREENHOUSES.

Arsov R., Todorov B., Ivanov P., Ivanov Iv. and Tzachev I. (Bulgaria): INFLUENCE OF THE LOW DOSES GAMMA RAYS ON THE PIGS IMMUNE REACTIVITY.

Tökei K. and Füredi J. (Hungary): EFFECT OF ACUTE AND RECURRENT GAMMA IRRADIATION ON THE YIELD COMPONENTS OF FIVE PEA SPECIES.

Sotirov L., Arsov R., Todorov B. and Tzachev I. (Bulgaria): LYSOZYME AND COMPLEMENT ACTIVITY AT THE IRRADIATED WITH LOW DOSES GAMMA RAYS PIGS.

Svetleva D. and Petkova S. (Bulgaria): CHLOROPHYLL MUTATIONS, INDUCED BY THE COMBINED EFFECT OF GAMMA-RADIATION AND N-NITROSO-N-ETHYLUREA IN PHASEOLUS VULGARIS (L.) SAVI.

Dimitriev D. (USSR): SOME ENVIRONMENTAL STIMULATION EFFECTS BY PLANTS, FROM THE SURROUNDINGS OF CHERNOBYL.

Lazanyi J. (Hungary): RECURRANT SELECTION FOR USE OF MICRO MUTANTS IN BREEDING PROGRAMS.

2. Session:

Brohi A.R. and Aydeniz A. (Turkey): EFFECT OF RADIATION TO PLANTS, GROWN UNDER GREENHOUSE CONDITIONS.

Kastori R. and Borsos M. (Yugoslavia): EFFECT OF LASER IRRADIATION ON INITIAL GROWTH OF SOME PLANT SPECIES.

Mednyanszky Zs. and Szabo A.S. (Hungary): INFLUENCE OF LIGHT-TREATMENT ON THE ENZYME-ACTIVITIES OF SOME VEGETABLES AND FRUITS DURING THE STORAGE-TIME.

Tutekova A. and Tchakalova E. (USSR): EFFECT OF HE/NE LASER TREATMENT OF WINTER SOFT WHEAT SEEDS ON ULTRA-STRUCTURE OF EMBRIO TISSUES AND CHLOROPLASTS OF 11-DAYS OLD SHOOTS.

3. Session:

Status reports and miscellaneous

- Status report from Turkey
- Status report from Hungary
- Status report from USSR
- Status report from Bulgaria
- Discussion about ESNA Stimulation Newsletter

WORKING GROUP 3 (TRACER TECHNIQUES IN ANIMAL SCIENCES)
Chairman: M. Jovanovic

1. Session: (NUCLEAR METHODS IN METABOLIC STUDIES)

Skalska-Hilgier E. and Ostaszewski P. (Poland): ACTIVITY OF THE BRANCHED-CHAIN ALFA-KETO ACID DEHYDROGENASE IN RAT AND SHEEP LIVER.

Ostaszewski P., Skalska-Hilgier E. and Gadomska M. (Poland): THE INFLUENCE OF A DIET ENRICHED WITH ALFA-KETOISOCAPROATE ON THE LAMB PERFORMANCE AND PLASMA INSULIN AND CORTISOL.

Mulligan W. Maclean J.M. and Preston T. (U.K.): BODY COMPOSITION AND EXERCISE IN RACING PIGEONS.

Kraljevic P., Emanovic D. and Mitin V. (Yugoslavia): HEMOGRAM IN THE RADIOACTIVE PHOSPHORUS (^{32}P) TREATED CHICKENS.

Simpraga M. (Yugoslavia): EFFECTS OF GAMMA RADIATION ON TIBIA FRACTURE HEALING IN DOG AFTER RIGID PLATE FIXATION.

Micic G. and Draganovic B. (Yugoslavia): CONTENTS OF RADIOCAESIUM 137 AND RADIOSTRONTIUM 90 IN BROILER NUTRIENTS RICH IN SOY.

2. Session: (USE OF NUCLEAR AND RELATED TECHNIQUES IN BIOTECHNOLOGY AND ANIMAL PATHOLOGY)

Dargie J.D. (Austria): THE ANIMAL PRODUCTION AND HEALTH PROGRAMME OF THE JOINT FAO/IAEA DIVISION IN DEVELOPING COUNTRIES.

Richards J., Plaizier K. and Perera B.M.A.O. (Austria): USE OF HORMONE RADIOIMMUNOASSAYS IN DEVELOPING COUNTRIES.

Djurdjevic Dj. and Zeremski M. (Yugoslavia): RADIOIMMUNOASSAY OF MILK PROGESTERONE IN COWS AS AN AID IN THE EVALUATION OF OVARIAN ACTIVITY IN THE POST PARTUM PERIOD AND IN EARLY PREGNANCY DIAGNOSIS.

Rothauer D. (Austria): USE OF DNA PROBES IN ANIMAL VIRUS DIAGNOSIS.

Hampl J., Rodak L., Smid B., Pospisil Z., Jurak E. and Skrobak F. (Czechoslovakia): RADIOIMMUNOASSAY KITS FOR DIAGNOSIS OF HERPESVIRUS INFECTIONS OF CATTLE AND SWINE.

Jeggo M.H. (Austria): USE OF NUCLEAR AND RELATED TECHNIQUES IN ANIMAL DISEASE DIAGNOSIS WITH PARTICULAR REFERENCE TO RINDERPEST.

3. Session: (RADIOIMMUNOASSAY AND RELATED TECHNIQUES IN ENDOCRINOLOGY)

Jovanovic M., Stojic V., Djurdjevic Dj. and Sinadinovic J. (Yugoslavia): PUERPERAL CHANGES OF THYROXINE AND TRIIODOTHYRONINE SERUM LEVELS IN DAIRY COWS.

Bobek S. and Sechman A. (Poland): IN VITRO CONVERSION RATE OF THYROXINE TO TRIIODOTHYRONINE IN THE LIVER OF MATURE HENS.

Kamal Abdel-Fattah I., Bobek S., Pietras M., Sechman A. and Niezgoda J. (Poland): THE HYPOMETABOLIC EFFECT OF 3,3',5'-TRIIODOTHYRONINE (RT_3); INTERACTION WITH HYPERMETABOLIC EFFECT OF 3,5,3'- TRIIODOTHYRONINE (T_3).

Stojic V. and Jovanovic M. (Yugoslavia): EFFECT OF HCG ON THYROXINE AND TRIIODOTHYRONINE PLASMA LEVELS IN BULLS.

Mitin V. (Yugoslavia): CONCENTRATION OF T-4, T-3 AND INSULIN IN THE SERUM OF LAYING HENS DURING EGGS PRODUCTION PERIOD.

WORKING GROUP 4 (PHYSICAL METHODS)
Chairman: W. Giese

1. Session:

Ernst D.E.W. (F.R.G.): NEUTRON ACTIVATION OF Eu-TAGGED SOIL.

Mikan A. and Krajcova V. (CSSR): PESTICIDE ASSAY BY MEANS OF PHOTOBACTERIUM PHOSPHOREUM LUMINESCENCE MEASUREMENT.

Bajo S., Tobler L. and Wyttenbach A. (CH): DETERMINATION OF THE TOTAL CONTENTS AND THE AVAILABILITY OF ELEMENTS IN A FOREST SOIL BY INSTRUMENTAL NEUTRON ACTIVATION ANALYSIS.

Szabo A.S. (Hungary): DETERMINATION OF BORON AND VANADIUM IN SOIL AND PLANT SAMPLES BY INAA-METHOD.

Buchtela K., Grass F. and Ismail S.S. (Austria): TRACE AND MINOR ELEMENT DETERMINATION IN SOIL AND PLANT MATERIALS BY NEUTRON ACTIVATION ANALYSIS.

Schnier C., Niedergesäß R., Pepelnik R. and Schnug E. (F.R.G.): MULTIELEMENT INVESTIGATIONS OF FERTILIZER PHOSPHATES BY MEANS OF INSTRUMENTAL NEUTRON ACTIVATION ANALYSIS (INAA).

Nagy A.Z. (Hungary): IRRADIATION FACILITIES FOR NEUTRON ACTIVATION ANALYSIS IN DUBNA.

2. Session:

Popovic D., Djuric G. and Spasic V. (Yugoslavia): SECONDARY STANDARDS IN ENVIRONMENTAL RADIOACTIVITY MONITORING.

Gralak M.A., Krasicka B., Kamalu T., Kulasek G. and Jaworek D. (Poland): THE EFFECT OF GAMMA RADIATION ON DIGESTIBILITY OF HIGH FIBER MATERIALS.

Schulze E., Breves G., Sallmann H.P. and Giese W. (F.R.G.): MEASUREMENT OF ACETATE PRODUCTION IN DOMESTIC ANIMALS BY STABLE ISOTOPE MASS SPECTROMETRY.

Draganovic B. and Micic G. (Yugoslavia): SUPPLEMENT TO INVESTIGATION OF TECHNOLOGY PROCESSES OF CAESIUM-134, 137-DECONTAMINATION OF BEEF AND LAMB MEAT.

Giese W. (F.R.G.): REDUCTION OF GASTRO-INTESTINAL RADIO-CAESIUM-ABSORPTION IN DOMESTIC ANIMALS BY SPECIAL FEED ADDITIVES.

3. Session:

Koch R., Poulsen-Noutrup C. and Giese W. (F.R.G.): HIGH RESOLUTION X-RAY IMAGING IN PLANT- AND ANIMAL-SPECIMES.

Giese W. (F.R.G.): A NEW CS-SELECTIVE ION EXCHANGE RESIN FOR THE DECONTAMINATION OF RADIOACTIVE FLUIDS.

WORKING GROUP 5 (SOIL-PLANT RELATIONSHIPS)
Chairman: E. Haunold

1. Session:

Eskew D.L., Bowen G.D. and Zapata F. (Austria): SOIL SCIENCE RESEARCH ACTIVITIES IN JOINT FAO/IAEA PROGRAMMES.

Becker-Heidmann P. and Scharpenseel H.W. (F.R.G.): NATURAL ^{14}C AND ^{13}C DISTRIBUTION PATTERNS AND ORGANIC MATTER DYNAMICS IN ALFISOLS.

Bors J. and Martens R. (F.R.G.): STUDIES ON THE ROLE OF SOIL BIOMASS IN THE SORPTION OF RADIOIODINE.

Gerzabek M.H., Ullah S.M. and Mück K. (Austria): CS-137 - UPTAKE BY PLANTS FROM CONTAMINATED AUSTRIAN SOILS.

2. Session:

Stoyanova-Nikolova I. (Bulgaria): TOTAL SUPPLY OF THE AVAILABLE PHOSPHATES IN SOIL LIMING.

Johansen H.S., Larsen S. and Middelboe V. (Denmark): ON USE OF OXYGEN-18 LABELLED PHOSPHATE IN SOIL AND PLANT RESEARCH.

Apostolakis C., Papanicolaou E., Skoufis D. and Spyrakos B. (Greece): UTILIZATION OF FERTILIZER-P BY MAIZE GROWN ON VARIOUS SOIL GROUPS IN A GREENHOUSE P-32 EXPERIMENT.

Serdinescu A. and Suteu G.E. (Romania): THE EFFECT OF INCREASING RATES OF PHOSPHORUS AND ZINC UPON ZINC AVAILABILITY FOR VINE (REFLECTIONS ON THE VALUE CONCEPT).

Horak O. and Zvacek L. (Austria): MICRONUTRIENT DEFICIENCY STUDIES.

Zsoldos F., Haunold E., Vashegyi A. and Herger P. (Hungary,Austria): POTASSIUM AND SULFATE UPTAKE OF WHEAT AND CUCUMBER ROOTS STRESSED WITH NITROGEN AND SULFATE SALTS.

Kralova M., Drazdak K., Kremen J., Fiserova J. and Dvorakova J. (Czechoslovakia): SOIL-PLANT RELATIONSHIPS IN WHEAT NUTRITION.

Ragab R., Beese F. and Ehlers W. (Egypt, F.R.G.): A NUMERICAL ANALYSIS OF SOIL WATER BALANCE AND DRY MATTER PRODUCTION OF OATS.

3. Session:

Hardarson G., Zapata F. and Danso S.K.A. (Austria): BIOLOGICAL NITROGEN FIXATION RESEARCH AND TRAINING ACTIVITIES OF THE FAO/IAEA PROGRAMME.

Jakovljevic M., Jelenic Dj. and Blagojevic S. (Yugoslavia): FIXATION OF $^{15}NH_4$ - NITROGEN IN VARIOUS SOILS AND ITS AVAILABILITY TO PLANTS.

Delgado M.J., Bigeriego M. and Chamber M. (Spain): MEASUREMENT OF N_2-FIXATION IN FIELD IN THREE SPECIES OF LUPINUS USING ^{15}N-LABELLED FERTILIZER.

4. Session:

Kralova M. and Richter R. (Czechoslovakia): DYNAMICS OF ^{15}N-UREA ASSIMILATION IN MAIZE SEEDLINGS.

Filipovic R., Mihajlovic N. and Lazarevic M. (Yugoslavia): STUDY OF FERTILIZER NITROGEN (N-15) UPTAKE UNDER FIELD LYSIMETER CONDITIONS DURING THE GROWTH OF MAIZE.

Van Cleemput O., Saoud A.A. and Baert L. (Belgium): UPTAKE AND BALANCE OF APPLIED LABELLED FERTILIZER NITROGEN BY POTATOES ON A CLAYEY SOIL.

Skarlou V., Papanicolaou E., Nobeli C. and Katranis N. (Greece): RESIDUAL EFFECT OF N-FERTILIZER IN CORN-WHEAT ROTATION.

Calancea L., Bologa M., Chiriac M. and Firu V. (Romania): UTILIZATION OF ISOTOPIC ANALYSES OF PLANTS FOR DETERMINING THE COEFFECIENT OF N AVAILABILITY FROM NITROGEN FERTILIZERS.

Kiss E. and Balint A. (Hungary): SELECTION IN WHEAT BY USING ^{15}N STABLE ISOTOPE.

5. Session:

Suteu G.E. (Romania): SEPARATION OF THE PLANT ORGANIC NITROGEN DERIVED FROM THE ASSIMILATION OF NITRATE AND AMMONIUM IONS.
I. THE EFFECT OF N-SERVE ON THE PROPORTION OF NH_4 ORIGINATING PLANT ORGANIC NITROGEN.

Ikonomova E., Balabanova-Georgieva R. and Lema Z. (Bulgaria): ^{15}N STUDY ON THE INFLUENCE OF THE CROP AND NITROGEN FERTILIZER ON THE SOIL NITROGEN MINERALIZATION POTENTIAL.

Balabanova-Georgieva R. and Ikonomova E. (Bulgaria): INVESTIGATIONS ON THE TRANSFORMATION AND BALANCE OF FERTILIZER NITROGEN UNDER THE CONDITIONS OF LEACHED CHERNOZEM-SMOLNITZA (MICRO-FIELD TRIAL WITH ^{15}N).

WORKING GROUP 6 (APPLIED MUTAGENESIS)
Chairman: G.P. Soressi

1. Session:

Brunner H. (Austria): MUTATION BREEDING TO IMPROVE TOLERANCE OF AZOLLA TOWARDS ALUMINIUM TOXICITY.

Borisov B. and Mukherjee R.N. (Austria): RADIATION MUTAGENESIS IN THE IMPROVEMENT OF TRADITIONAL MICROBIAL FERMENTATION OF CASSAVA.

Coutinho M.P. (Portugal): TWO MUTANTS OF VINE, RESISTANT TO DOWNY MILDEW, OBTAINED BY GAMMA IRRADIATION OF SOMATIC MATERIAL.

Muszynski S. and Darlewska M. (Poland): MUTANTS INDUCED IN WINTER RYE BY FAST NEUTRONS.

Novak F.J. (Austria): IN VITRO MUTATION BREEDING TECHNIQUES FOR APOMICTIC CROPS.

WORKING GROUP 7 (ENVIRONMENTAL POLLUTION)
Chairman: M.J. Frissel
+ 8 (ENERGY IN AGRICULTURE)
Chairman: E. Smedile

1. Session: (ORGANIC POLLUTANTS)

Tjell J.Chr., Hussain M. and Hassan A. (Austria): SELECTED TOPICS ON CHEMICAL RESIDUES IN AGRICULTURE USING NUCLEAR TECHNIQUES.

Pichlmayer F. (Austria): APPLICATION OF STABLE ISOTOPE RATIO ANALYSIS TO FOOD SURVEILLANCE AND ENVIRONMENTAL RESEARCH.

Ieradi L.A., Pastore P., Van Axel Castelli I., Mattei T. and Cristaldi M. (Italy): ENVIRONMENTAL POLLUTION: EFFECTS IN WILD RODENTS LIVING IN TIBER RIVER AREA (ITALY).

Fourcy A., Blake G. and Plebin R. (France): INCORPORATION OF ^{14}C PCP BY AQUATIC MACROPHYTES. USE IN STUDIES OF POLLUTION BY PESTICIDES.

Ecker S. and Horak O. (Austria): THE UPTAKE OF HEXACHLOROBENZENE BY OIL - PUMPKIN PLANTS.

Kalic-Filipovic D., Beric N. and Filipovic B. (Yugoslavia): LONG TERM PESTICIDES INFLUENCE ON WOMEN WORKERS HEALTH CONDITION.

2. Session: (RADIO CONTAMINATION)

Schönhofer F. and Tataruch F. (Austria): CONTAMINATION OF GAME IN AUSTRIA AFTER THE CHERNOBYL ACCIDENT AND THE "TRANSFER PROBLEM".

Mück K. (Austria): CONTAMINATION OF FOOD IN THE FIRST AND SECOND YEAR AFTER THE CHERNOBYL ACCIDENT AND ITS DERIVED DOSE TO THE AUSTRIAN POPULATION.

Carini F., Botteschi G. and Silva S. (Italy): WHEAT RADIOAKTIVE CONTAMINATION IN THE ITALIAN TERRITORY WITH PARTICULAR REFERENCE TO THE PROVINCE OF PIACENZA AS A CONSEQUENCE OF THE CHERNOBYL ACCIDENT.

Mascanzoni D. (Sweden): LEVELS OF 137-CS IN SWEDEN 1986 - 88.

Förstel H. (F.R.G.): RADIOECOLOGICAL PATHWAY OF ELEMENTARY TRITIUM AFTER ITS DEPOSITION INTO TOP - SOIL.

Lönsjö H. (Sweden): DEPTH DISTRIBUTION OF RADIOCESIUM IN AGRICULTURAL SOILS IN CHERNOBYL FALLOUT AREAS OF SWEDEN IN 1987 - 88.

Becker-Heidmann P. and Scharpenseel H.W. (F.R.G.): STUDIES ON THE MIGRATION OF 137-CS FROM THE REACTOR ACCIDENT OF CHERNOBYL IN SOILS IN THE REGION OF HAMBURG.

Saracevic L., Kljajic R., Horsic E. and Samek D. (Yugoslavia): LEVELS OF ACTIVITIES AND MIGRATIONS OF CERTAIN RADIONUKLIDES IN SOIL IN THE WIDER SARAJEVO REGION.

Frissel M.J., Keverling Buisman A.S., Stoute J.R.D., Mattern F.C.M. and Drost R.M.S. (Netherlands): THE AVAILABILITY OF DEPOSITED 137-CS TO MAN.

Eriksson A. (Sweden): USE OF CHERNOBYL FIELD DATA IN MODELLING CAESIUM TRANSFER TO GRASSLAND CROPS.

Pfau A.A. and Fischer R. (BRD): ON THE TRANSFER OF RADIOSILVER FROM PLANT TO ANIMAL.

Cristaldi M., D'Arcangelo E., Ieradi L.A.,Mascanzoni D., Mattei T. and Van Axel Castelli I. (Italy, Sweden): CHERNOBYL ACCIDENT ONE YEAR LATER: GENETIC DAMAGE AND 137-CS ACCUMULATION IN WILD RODENTS IN ROME, ITALY.

3. Session: (HEAVY METALS)

Abouelkhair K.S. (Egypt): THE INFLUENCE OF CADMIUM ON THE GROWTH AND MINERAL CONTENT OF EUCALYPTUS CAMALDULENSIS SEEDLING INOCULATED WITH PISOLITHUS TINCTORIUS.

Baghdady N.H. and Rabie A.A. (Egypt): HEAVY METALS CONTAMINATION OF DIFFERENT VEGETABLE PLANT SPECIES IN EGYPT.

Baghdady N.H. (Egypt): SEED GERMINATION TEST FOR ASSESSING THE TOXICITY LIMITS OF SOME BIOGENIC AND NON-BIOGENIC HEAVY METALS.

4. Session: (WORKING GROUP 8: ENERGY IN AGRICULTURE)

Arenas Cuevas M. (Spain): THE EXPLOITATION OF THE THERMAL EFFLUENTS AND GEOTHERMAL ENERGY WITH VERY LOW ENTAPLY FOR GREENHOUSES HEATING IN SPAIN.

Trzebiatowski R. (Poland): UTILIZATION OF POWER PLANT THERMAL EFFLUENT TO FISH CULTURE IN POLAND.

Smedile E. and Parrini F. (Italy): NON-CONVENTIONAL ENERGY UTILIZATION FOR GREENHOUSES HEATING: METHODOLOGICAL APPROACH TO JUDGING THE ATTRACTIVNESS OF THE INVESTMENT.

Parrini F. and Pulvirente S. (Italy): THERMOELECTRIC PLANTS WASTE HEAT UTILIZATION FOR PROTECTED ORNAMENTAL CULTIVATIONS.

WORKING GROUP 9 (GENETICAL METHODS IN PEST CONTROL)
Chairman: R.J. Wood
+ 10 (RADIOISOTOPES IN INSECT ECOLOGY)

1. Session:

Lindquist D.A. (Austria): THE FAO/IAEA PROGRAMME IN GENETIC CONTROL OF INSECTS.

Southern D.I. and Hartman T.P.W. (U.K.): THE ADVANTAGES OF A NEW CYTOLOGICAL APPROACH TO FEMALE MEIOSIS IN SOME DIPTERAN INSECT PESTS.

Szlendak E. (Poland): POSTIRRADIATION ULTRA STRUCTURAL CHANGES IN GONIAL CELLS AND REPRODUCTIVE TRACT OF ACARUS SIRO (L.).

Ignatowicz S. (Poland): INHERITED STERILITY IN THE ACARID MITES (ACARI:ACARIDAE).

2. Session:

Economopoulos A.P. (Austria): EVALUATION OF A WHITE-FEMALE-PUPA CERATITIS CAPITATA STRAIN UNDER LARGE-SCALE ARTIFICIAL REARING.

Kerremans Ph. and Busch-Petersen E. (Austria): POLYTENE CHROMOSOME ANALYSIS OF TWO GENETIC SEXING STRAINS OF THE MEDITERRANEAN FRUIT FLY, CERATITIS CAPITATA (WIED.).

Shahjahan R.M. and Wood R.J. (U.K.): LABORATORY STUDIES DIRECTED TOWARDS THE DEVELOPMENT OF A GENETIC SEXING TECHNIQUE IN MEDITERRANEAN FRUIT FLY CERATITIS CAPITATA (WEID.).

Busch-Petersen E. and Kafu A. (Austria): GENETIC SEX SEPARATION IN THE MEDFLY, CERATITIS CAPITATA: RESPONSE OF T:Y (WP+) 30C TO WILD-TYPE CONTAMINATION UNDER LABORATORY CONDITIONS.

Ignatowicz S. (Poland): THE FURTHER STUDIES ON SEX RATIO DISTORTION IN THE FLOUR MITE, ACARUS SIRO L. (ACARINA:ACARIDAE).

3. Session:

Flushing de Brown E.J. and Wood R.J. (U.K.): GENETIC AND ELECTROPHYSIOLOGICAL STUDIES ON PYRETHROID RESISTANCE IN THE MOSQUITO AEDES AEGYPT L.

Khayrandish A. and Wood R.J. (U.K.): ORGANOPHOSPHATE AND CARBAMATE RESISTANCE IN MOSQUITOES OF THE CULEX PIPIENS COMPLEX.

Malinowski H. (Poland): INHERITANCE OF RESISTANCE TO PHOTOSTABLE PYRETHROIDS IN THE HOUSEFLY, MUSCA DOMESTICA L.

Malinowski H., Kroczynski J. and Szczesna E. (Poland): THE SUSPECTIBILITY OF COLORADO POTATO BEETLE(LEPTINOTARSA DECEMLINEATA SAY)TO SOME INSECTICIDES IN POLAND.

Mouches C. (France): GENE AMPLIFICATION IN INSECTICIDE RESISTANT MOSQUITOES AND DEVELOPMENT OF GENETIC ENGINEERING TECHNIQUES IN INSECTS

Szizesna E. (Poland): THE SUSPECTIBILITY OF COLORADO POTATO BEETLE TO SOME INSECTICIDES IN POLAND.

4. Session:

Rosada J. (Poland): RESEARCH ON THE MIGRATION AND HIBERNATION OF PREDATORY BUG PODISUS MACULIVENTRIS SAY USING RADIOTRACER ^{32}P.

Ignatowicz S. (Poland): INHERITANCE OF PHOTOPERIODIC RESPONSES CONTROLLING DIAPAUSE IN SPIDER MITES (ACARINA:TETRANYCHIDAE).

Novak D. (Czechoslovakia): AROMATIC BALMS AND EMBROCATION AS POSSIBLE MOSQUITO REPELLENTS.

5. Session: (Jointly with WG 1/12)

Busch-Petersen E., Rigney C.J. and Rahman R. (Austria): THE SUPRAOESOPHAGEAL GANGLION AS AN INDICATOR OF IRRADIATION TREATMENT DURING QUARANTINE FRUIT INSPECTION.

Brzostek G. and Ignatowicz S. (Poland): RADIATION DISINFESTATION OF FOOD PRODUCTS INFESTED BY THE ACARID MITES (ACARI:ACARIDAE).

Ignatowicz S. (Poland): USE OF IRRADIATION AS A QUARANTINE TREATMENT OF AGRICULTURAL PRODUCTS INFESTED BY ACARID MITES (ACARI:ACARIDAE).

Szlendak E. (Poland): ANATOMY OF ACARUS SIRO REPRODUCTIVE SYSTEM.

Ignatowicz S. (Poland): RADIATION BIOLOGY OF THE ACRID MITES (ACARI:ACARIDAE).

Brzostek G. (Poland): IRRADIATION AS A QUARANTINE TREATMENT FOR BEANS INFESTED BY THE BEAN WEEVIL, ACANTHOSCELIDES OBTECTUS SAY (COL., BRUCHIDAE).

WORKING GROUP 11 (NUCLEAR METHODS IN PLANT PHYSIOLOGY)
Chairman: D.A. Baker

1. Session:

Hoad G.V. (U.K.): HORMONAL CONTROL OF FRUIT GROWTH AND DEVELOPMENT.

Borkovec V., Ibrahim D.M.E. and Prochazka S. (Czechoslovakia): THE TRANSLOCATION OF 14C-SUCROSE AND 14C-BENZYLADENINE IN WINTER WHEAT (TRITICUM AESTIVUM L.) IN THE PERIOD BEFORE ANTHESIS.

Baker D.A. (U.K.): ^{14}C-LABELLED AUXIN MOVEMENT IN THE VASCULAR SYSTEM OF RICINUS.

Gej B. (Poland): PHOTOSYNTHETIC ACTIVITY OF AWNED AND AWN-DEPRIVED RYE EARS.

Roeb G.W. and Führ F. (F.R.G.): TRANSLOCATION, ACCUMULATION AND RESPIRATION OF LABELLED ASSIMILATES IN WHEAT PLANTS.

Soja G. (Austria): FRUCTAN METABOLISM IN JERUSALEM ARTICHOKE (HELIANTHUS TUBEROSUS L.): TRANSLOCATION OF 14C-ASSIMILATES.

Ueckert J., Niemann E.G. and Fendrik I. (F.R.G.): INVESTIGATIONS ON INTERNAL GASTRANSPORT FROM SHOOTS TO ROOTS FROM KALLAGRASS (LEPTOCHLOA FUSCA L.) AND RICE.

2. Session:

Wieneke J. (F.R.G.): CRITICAL EVALUATION OF TRACER UPTAKE EXPERIMENTS USING $^{36}ClO_3$ AS A NITRATE ANALOG.

Mozafar A. and Oertli J.J. (Switzerland): ERROR IN ^{86}RB UPTAKE BY BARLEY (HORDEUM VULGARE) INDUCED THROUGH TITRATION OF UPTAKE MEDIUM WITH NAOH.

Kuczera J., Fogt A. and Kubica K. (Poland): ION TRANSPORT PROPERTIES OF LIPOSOME MEMBRANES INFLUENCED BY ALKYL SULPHONATE COMPLEXES WITH BIOLOGICALLY ACTIVE DODECYLOXY-METHYLENE-METHYLMORPHOLINUM CHLORIDE.

Thomas T.H. (U.K.): HERBICIDE RESISTANCE IN WEEDS.

Hoad G.V. (U.K.): POTENTIAL FOR MANIPULATING GROWTH AND DEVELOPMENT OF SELECTED ARABLE CROPS USING XENOBIOTICS.

Hoad G.V. (U.K.): MANIPULATION OF GIBBERELLIN AND STEROL LEVELS IN PLANTS USING XENOBIOTICS.

3. Session:

Schmidt J., Buttgereit J., Grahsl A., Laurer Ch. and Wilhelm E. (Austria): TREE TISSUE CULTURE - A MAJOR TOOL TO SELECT USEFUL VARIANTS?

Lickl E., Beck R.H.F. and Ebermann R. (Austria): RESPONSE OF PEROXIDASE AND AMYLASE ISOENZYME ACTIVITIES OF AESCULUS HIPPOCASTANUM AND PICEA ABIES TO GAMMA AND BETA IRRADIATION.

Ebermann R. and Korori S.A.A. (Austria): TEMPERATURE AND AGE DEPENDENT ALTERATION OF WOOD PEROXIDASE AND AMYLASE ISOENZYMES IN QUERCUS ROBUR AND PICEA ABIES.

Dmitriev A., Grodzinsky D. and Guscha N. (USSR): INDUCED RESISTANCE AND THE REUTILIZATION OF RADIONUCLIDES FROM BULBS TO DEVELOPING PLANTS.

POSTER SESSION

WORKING GROUP 1

Dabrowski C.A. and Jaroszewicz J. (Poland): POSSIBILITIES OF FOOD CONSERVATION BY MEANS OF IONIZING RADIATION FROM THE POLISH RESEARCH NUCLEAR REACTORS EWA AND MARIA.

Oryga J. and Ostrowski T. (Poland): DESIGN, CONSTRUCTION AND INSTALLATION OF A STERILIZATION DOSE MEASURING DEVICE.

WORKING GROUP 5

Ahamer G. and Müller Hj. (Austria): CS-137 UPTAKE IN AQUATIC VEGETATION OF STYRIA / AUSTRIA.

Gheorghe D. and Suteu G.E. (Romania): THE NITROGEN DERIVED FROM THE AIR IN THE PSAMMOSOIL-GROWN COWPEA (VIGNA SINENSIS, CV. JIANA).

Kerpen W. (F.R.G.): CS-137 UPTAKE AS TRANSFER (TF) INTO CEREALS IN RELATION TO PROPERTIES OF 17 SOILS.

Meisel S., Graller P., Kahr G., Ninaus W. and Müller Hj. (Austria): DISTRIBUTION OF FISSION RADIONUCLIDES IN CULTIVATED SOILS OF STYRIA AFTER CHERNOBYL.

Negrescu I. and Suteu G.E. (Romania): DISTRIBUTION AMONG THE ORGANS AND EFFECTIVENESS OF USE OF SPLIT APPLIED FERTILIZER NITROGEN BY PEACH TREES.

Walter I., Delgado Ma.J. and Bigeriego M. (Spain): INFLUENCE OF CD FROM SEWAGE-SLUDGE ON NITROGEN FIXATION IN LUPINUS PLANTS.

WORKING GROUP 7

Fagniart E., Colard J. and Kirchmann R. (Belgium): LEACHING OF ^{60}Co AND ^{134}Cs FROM THE ROOTING ZONE OF AN EXPERIMENTAL FIELD.

WORKING GROUP 11

Nicoldi R., Pieber K. and Schmidt J. (Austria): MICROPROPAGATION OF PYRUS BETULIFOLIA.

Closing Session

Friday, Sep. 2nd, 1988

Plenary Lecture 9.00-10.45 h

Perspectives of Biomass Utilization
in Austria.
Prof. Dr. H. Wohlmeyer
Austrian Association for Agricultural Research,
Vienna

Break 10.45-11.15 h

Report of Working Group Chairmen 11.15-12.30 h

Closing Ceremony 12.30-13.00 h

Reports by

Prof. Dr. E. Haunold
The local secretary

Dr. B. Sigurbjörnsson
The Vice President of the Conference

Dr. D. de Zeeuw
The President of ESNA

DIE ÖSTERREICHISCHE HAGELVERSICHERUNG SCHÜTZT DEN LANDWIRT

Forschen - schützen - helfen

Wer so wie der Landwirt seine Werkstatt unter freiem Himmel hat und dessen Existenz auf den Vorgängen der Natur beruht, der muß jede Möglichkeit ausschöpfen, die zu seinem Schutz und Nutzen geboten wird. Forschung und Wissenschaft haben in den letzten 150 Jahren entscheidende Leistungen erbracht und damit tiefgreifende Umwälzungen in der Landwirtschaft bewirkt. Ein Bereich war davon spürbar ausgenommen, jener der Naturkatastrophen, wozu auch der Hagel zählt. Noch immer schlägt das Eis vom Himmel überall und nicht vorhersehbar zu. Wenn mit dem Forschen das Auslangen nicht gefunden werden kann, ist der beste Schutz gegen Naturkatastrophen die Hilfe einer Versicherung.

Gleichgültig, ob der Landwirt über Erträge verfügt oder ob Hagelunwetter Kulturen vernichtet haben und keine Ernte zum Verkauf vorhanden ist, müssen die laufenden Baraufwendungen befriedigt werden. Solche sind bei den heutigen Betriebsformen zumeist in hohem Maße erforderlich, und die Vernichtung der Ernte kann die Liquidität und damit die Existenz eines Betriebes weitestgehend gefährden.

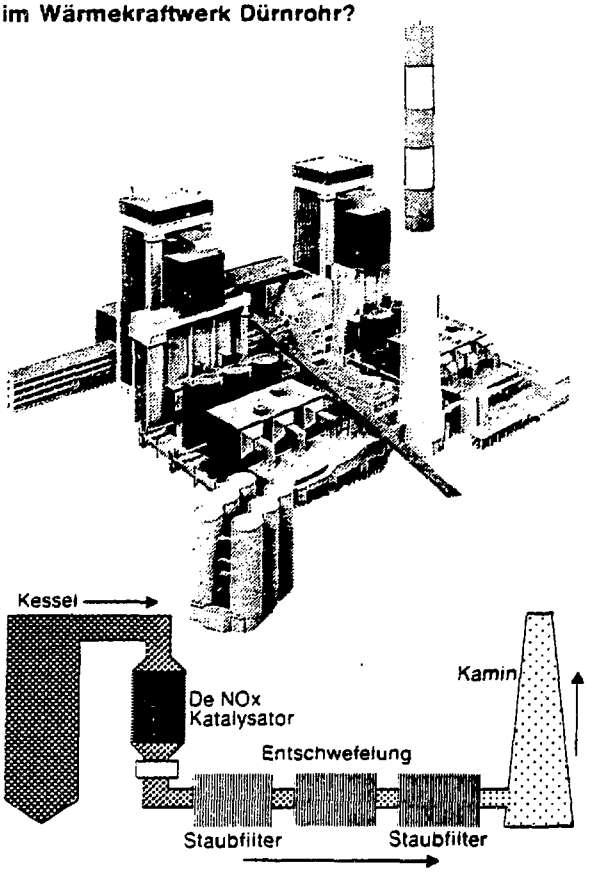
Eine Hagelversicherung abzuschließen ist vor allem deshalb attraktiv, weil

* sie einen Rechtsanspruch auf eine Entschädigung schafft,
* die Abdeckung der Risken auf die gegebenen Verhältnisse im eigenen Betrieb ermöglicht wird,
* die Höhe der Versicherungssumme nach eigenem Ermessen festgesetzt werden kann und
* durch einen Beitrag aus Bundes- und Landesmitteln jedem versicherten Landwirt die Prämie verbilligt wird.

Das ist sicherlich ein betriebswirtschaftlich wertvoller Anreiz, sich der Österreichischen Hagelversicherungsanstalt als Riskengemeinschaft anzuschließen.

Verbundkraft Elektrizitätswerke GesmbH. (VKG) und Energieversorgung Niederösterreich AG (EVN) erzeugen Energie und schützen die Umwelt

Wie *funktioniert* die Rauchgasreinigung im Wärmekraftwerk Dürnrohr?



3.600 Millionen für den Umweltschutz Dürnrohr: ein Gesamtsystem für saubere Luft

Im Kraftwerk Dürnrohr sorgt ein Gesamtsystem für den optimalen Umweltschutz.

Eine Entschwefelungsanlage, eine Entstickungsanlage, Staubfilter, die Verwertung der Rauchgasendprodukte und ein Umweltmeßsystem bilden eine Einheit.

Der Einsatz stickoxidarmer Brenner und die Verwendung polnischer Kohle mit geringem Schwefelgehalt bewirken, daß die Emissionen des Kraftwerkes von Anfang an niedrig gehalten werden, die Entschwefelungsanlage arbeitet mit einem Wirkungsgrad von mindestens 90 Prozent.

10.000 Katalysatoren sorgen dafür, daß mindestens 80 Prozent des Stickoxides in Luftstickstoff und Wasserdampf zerlegt werden.

Die Rauchgase werden zu 99,8 Prozent entstaubt. Die bei der Rauchgasreinigung entstehenden Abfallprodukte werden in der Baustoffindustrie als Rohstoff eingesetzt.

Umweltmeßsystem überwacht Luftqualität rund um die Uhr

Über den Gehalt von Schadstoffen in der Luft wachen 7 Meßstellen im Tullnerfeld. Pro Station werden Schwefeldioxid, Stickoxid, Windrichtung, Windgeschwindigkeit, Temperatur, Luftfeuchtigkeit und Niederschlagsmenge gemessen. Die Daten werden in die Leitzentrale des Kraftwerks übertragen, von der Behörde kontrolliert und der Einsatz des Werkes wird dementsprechend gesteuert.

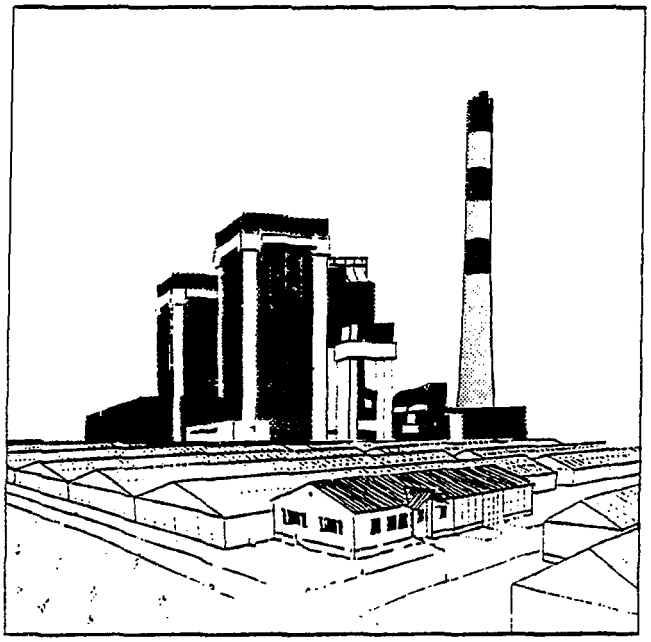
Rauchgas mit "Mascherl"

Das Österreichische Forschungszentrum Seibersdorf hat die SF6-Tracer-Methode weiterentwickelt, mit der die Markierung von Gasen möglich ist. Damit können die Verursacher von Schadstoffen in der Luft eindeutig festgestellt werden. Das Bundesinstitut für Gesundheitswesen stellte erst kürzlich fest, daß der Schadstoffausstoß des Kraftwerkes auf die Luftgüte des Tullnerfeldes keinen Einfluß hat. Die gesetzlich vorgeschriebenen - sehr strengen - Grenzwerte werden weit unterschritten.

Umgebungsüberwachung im Interesse der Umwelt

Das landwirtschaftliche Gebiet rund um das Kraftwerk unterliegt einer strengen Kontrolle. Es werden Böden und Pflanzen analysiert und empfindliche physiologische Untersuchungen an Indikatorpflanzen in Open-Top-Chambers durchgeführt. Die bisherigen Ergebnisse zeigten, daß die großen finanziellen Investitionen von über 3,6 Mrd. Schilling für den Umweltschutz richtig waren.

Verbundkraft Elektrizitätswerke GesmbH. (VKG) und Energieversorgung Niederösterreich AG (EVN) beschreiten neue Wege in der Energienutzung: Abwärme aus Dürnrohr für Gärtnereisiedlung



Schon bald werden neben dem Kraftwerk Dürnrohr auch im Winter die Blumen blühen.

Nicht, daß wir Kraftwerksbetreiber jetzt auch noch unter die Gärtner gehen. Nein, wir haben in Zusammenarbeit mit der NÖ Landeslandwirtschaftskammer das Projekt "Gärtnereisiedlung Dürnrohr" ausgearbeitet und setzen es nun in die Tat um. Die Abwärme des Kraftwerks soll zum Heizen von Glashäusern verwendet werden.

Auf einem 117.000 Quadratmeter großen Gelände werden Gärtner angesiedelt. Glashäuser mit einer Gesamtfläche von bis zu 30.000 Quadratmetern sollen entstehen, in denen Blumen und Gemüse übers Jahr hindurch gezogen werden können. Rosen, Nelken und Gerbera werden im Tullnerfeld erblühen.

Möglich ist das alles durch die Bereitstellung von Wärme aus dem Kraftwerk. Die "Abwärme" aus Generatoren und Transformatoren wird dazu benutzt. Zusätzlich werden Strom und Wasser zur Verfügung gestellt. Und das alles zu äußerst günstigen Kosten.

Die Vorteile dieser Kooperation liegen auf der Hand: Zum einen ersparen wir uns 50 Millionen an Importen für Gemüse. Andererseits wird der Gesamtwirkungsgrad des Kraftwerkes verbessert. Mehr Energie wird aus der Steinkohle gewonnen.

Dürnrohr ist ein Kraftwerk der neuen Art. Es verbindet umweltfreundliche Energieerzeugung und höchste Energienutzung zu einem Gesamtsystem.

WORKING GROUP 3

THE HYPOMETABOLIC EFFECT OF 3,3',5'-TRIIODOTHYRONINE (rT_3); INTERACTION WITH HYPERMETABOLIC EFFECT OF 3,5,3'-TRIIODOTHYRONINE (T_3)

K.I. ABDEL-FATTAH, S. BOBEK, M. PIETRAS, A. SECHMAN and J. NIEZGODA

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ABSTRACT

In some physiological situations like stress, an increase in plasma T_3 is followed by an increase in rT_3. It is postulated that rT_3 is an antagonist of T_3. The aim of this experiment was to study the effect of rT_3 on O_2-consumption in one day-old chickens. They were divided into 5 groups - each of 6 chickens.

The groups were treated as follows:

1. control - without injection;
2. control-injected with 100 µl of solvent (0.01N NaOH in saline);
3. 10 µg rT_3/chicken;
4. 0.5 µg T_3/chicken;
5. rT_3+T_3, 10 µg rT_3+0.5 µg T_3/chicken.

The O_2-consumption was measured in diaferometer Kipp & Zonen in neutral temperature (30 °C) at 0, 1, 2, 3 and 4 hours after injection. Corresponding groups of other chickens served after decapitation for blood collection only. The thyroid hormones - T_4, T_3 and rT_3 were measured by radio-immunoassay.

RESULTS:
rT_3 decreases O_2-consumption by 25% at 2 hours after injection. In group rT_3+T_3 the increase of O_2-consumption was reduced to 0.8% at 2 hours after injection, then it sharply increased. An injection of solvent reduces the rise of control O_2-consumption to 0.79% at 4 hours after injection, in control group without injection, O_2-consumption rose by 7% at 4 hours.

WORKING GROUP 7

THE INFLUENCE OF CADMIUM ON THE GROWTH AND MINERAL CONTENT OF EUCALYPTUS CAMALDULENSIS SEEDING INOCULATED WITH PISOLITHUS TINCTORIUS

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ABSTRACT

The objective of this work was to determine the effect of cadmium levels in irrigation water on growth, mineral and chlorophyll contents and water consumption of Eucalyptus camaldulensis seedlings inoculated with Pisolithus tinctorius and grown in sand culture.

The results indicated that as the Cd levels increased from 0 to 16 ppm there was a general decrease in seedlings height, whereas, other measured factors (i.e. diameter, fresh and dry weight, leaf area and water consumption) were not affected by the Cd levels used.

The chlorophyll contents in leaves increased with increasing Cd levels. The results indicated that only N and Ca uptake differ according to the plant organs (i.e. leaf, stem and root) whereby the uptake of these two elements by the leaves was higher than by other organs. Generally, the uptake of micronutrients by roots was higher than by other organs.

It can be concluded that irrigation water containing Cd levels until 16 ppm can be used without harmful effect on Eucalyptus camaldulensis seedlings inoculated with Pisolithus tinctorius.

WORKING GROUP 5

Cs-137 UPTAKE IN AQUATIC VEGETATION OF STYRIA / AUSTRIA

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ABSTRACT

Especially since the event of Chernobyl the following question raised in importance: To what extent occurs transfer of radioactive cesium from soil to plant?
In literature one may find values for the transfer coefficient TC = activity in plants / activity in soil; differing by two orders of magnitude. The interest of this work is to try to evaluate these differences by means of additional investigations: Various measurements in the fields of soil science, mineralogy and chemistry are undertaken to be able to correlate the TC with parameters as: pH of the soil, clay content, content of organic matter, particle size distribution, clay minerals in the fraction of 2 µm (especially montmorillonite), content of stable K and Cs. In the field of plant physiology also the sampling season, root depth etc. should be taken into consideration.
For each plant an "exclusion factor" can be calculated: EF = TF(Cs)/TF(K) in order to give information on the situation of K-supply at the regarded biotope.
In the region of Styria (Austria) sediment and plant samples (35 different species) were taken from 26 investigated locations like lakes, ponds, swamps and disconnected parts of rivers and measured in a GeLi-detector.

Probably this work will succeed at giving a hint to discriminate relevant and non-relevant parameters for the uptake of radioactive cesium by plants and might yield a description of the influence of the mentioned parameters.

WORKING GROUP 1

STORAGE EXPERIMENT WITH IRRADIATED POTATOES

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ABSTRACT

Potato varieties Desire and Metal were irradiated with 0, 50, 100 and 500 Gy and were stored at 5 and 25 °C. The tubers were analised for reducing and total sugar, starchcontent, respiration, weight loss, change in texture, spoilage and sprouting as a function of storage time. The investigations are still going on in the time of submitting the summary.

WORKING GROUP 5

UTILIZATION OF FERTILIZER-P BY MAIZE GROWN ON VARIOUS SOIL GROUPS IN A GREENHOUSE P^{32} EXPERIMENT

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ABSTRACT

A greenhouse experiment was performed using P^{32}-tagged fertilizer in order to study the utilization of phosphorus by maize grown on various soil groups.

The inherent soil fertility status and the interactions of the added fertilizer have been evaluated through measurements of the growth rate of the plants for the duration of the experiment.

The influence of the varying soil properties on the utilization of phosphorus has been studied through determinations of the plant uptake.

A different behaviour of the soil groups is indicated by the obtained results which may prove helpful to agricultural practice.

WORKING GROUP 8

THE EXPLOITATION OF THE THERMAL EFFLUENTS AND GEOTHERMAL ENERGY WITH VERY LOW ENTALPY FOR GREENHOUSES HEATING IN SPAIN

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ABSTRACT

There are three ways for the use of water with very low entalpy for greenhouse heating:

1. Thermal effluents of the nuclear, oil and coal power plants, of the dust incineration and of the others industrial process. The resource is the cooling effluents water at 30 - 40 ^{o}C.

   There are good expectations on the use of that waters but, at this moment, only two pilot projects are in operation.

2. Geothermal energy. Nearly thirty wells have been performed but the greater part for research and preexploitation. The exploitation wells for agricultural purposes have a depth of 400 - 800 m and are located in Cataluna. On the other hand, other wells drilled for irrigation groundwater exploitation have oved a hot-acuifer with very low entalpy. One hundred of these are located in Murcia and a dozen more located in regions such as Catalonia, Andalusia, Galicia and Castilla-Leon. At present seven wells are in exploitation for greenhouses heating.

3. The use of the groundwaters for the heatpump. They can be interesting in Spain, e.g. in the service area of the community as well as in agricultural applications. At present two demonstration projects for greenhouse-heating and tobacco-drying respectively, are started.

WORKING GROUP 2

INFLUENCE OF THE LOW DOSES GAMMA-RAYS ON THE PIGS IMMUNE REACTIVITY

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ABSTRACT

The experiments were carried out with 2 months old pigs devided in four groups:

I- controls;
II- vaccinated against salmonellosis;
III-irradiated after vaccination;
IV- irradiated before vaccination.

The animals were irradiated by gamma-installation "Gammatron-3" at 40 rad. Some indeces of the non-specific resistance and the immune reactivity were recorded in development.

The results suggest that no essential changes in the cell immune reactivity appear, which can be explained by the fact that the salmonelles are tymus-independent antigenes.

Significant differences in the total protein and immunoglobolines contents between the diferent groups are also not observed.
At the same time the irradiated before vaccination as well as the irradiated post vaccination pigs show a higher and more stable antigene titre compared to the pigs which are only vaccinated.

The lymphocytes of the irradiated after vaccination pigs show a higher biological activity then the other groups.

Now experiments with different doses of gamma-rays are conducted in order to find out the optimal doses for immune reactivity stimulation.

WORKING GROUP 1

DEPENDENCE OF THE RETROGRADIATION DEGREE OF GAMMA ^{60}Co IRRADIATED TRITICALE STARCHES IN THEIR PHYSICO-CHEMICAL PROPERTIES

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ABSTRACT

Triticale starches gamma irradiated with the doses 0.1 to 5 kGy have been studied. Under investigation were starches isolated by a laboratory method from the Lasko variety and Lad, Mah strains as well from wheat Grana variety for comparison. All starches were studied, taking into consideration following properties: reducing properties, λ_{max}, water binding and the solubility in water at the temperatures from 60 to 90 °C, as well as the characteristics of forming 6% pastes, and the degree of retrogradation during 12 days storage at 7 °C.

The results which have been obtained point to the dependence of the degree of retrogradation on the botanic origin of starch.
The starch isolated from wheat (Grana) is characterized by a much higher degree of retrogradation than starches isolated from the varietes and strains of triticale. It seems that this difference is caused first of all by a higher reducing power and solubility as well as to a lesser extent by a lower viscosity of triticale starch as compared to wheat starch. The degree of retrogradation depends also on the dose of radiation. The dose 2 kGy and more brought about a minimum degree of retrogradation for all starch samples being studied. The degree of retrogradation increased considerable for first fife days of paste storage and showed only small changes during the next seven days. Along with the increase in the solubility in water (for all the temperatures being studied), the increase in the reducing power, but the decrease in the viscosity of pastes was observed. However, independent of the dose of radiation, for all starches under investigation - except the MAH starch, the value of λ_{max} is kept on the constant level of 600 nm, what indicates a similar degree of polimerization. For MAH starch characterized by lowest reducing power, lower solubility and viscosity, a small decrease in this value, from 598 up to 586 nm is observed along with the increase in radiation dose.

WORKING GROUP 7

SEED GERMINATION TEST FOR ASSESSING THE TOXICITY LIMITS OF SOME BIOGENIC AND NON-BIOGENIC HEAVY METALS

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ABSTRACT

The effect of biogenic (Co, Cu and Zn) and non-biogenic (Cd, Ni and Pb) heavy metals on the root length, germinated from seeds of mono- and dicotyledons, was determined in an attempt to define toxicity limits for heavy metals, accumulating in soils.

In general, different species responded different to increasing heavy metal concentrations in their germination medium. Root elongation from all examined seeds species was stimulated by the introduction of zinc. Inhibition of seed germination, as compared to the control treatment, only occured in Monocotyledons at the 50 ppm zinc level. Among the other examined heavy metals, only copper, in concentration upto 1 ppm, was able to enhance root growth from rice and bean seeds. Rice seed germination was effectively inhibited by 0.25 ppm cobalt. Cadmium was the most toxic of the heavy metals, inhibiting root growth of all examined species significantly .

Bean seeds were particularly sensitive, as 0.50 ppm Co, Ni or Pb already caused significant root growth inhibition. Lens was relatively resistant, as 1 ppm Co, Cu or Ni, and 10 ppm Pb failed to reduce root growth. Corn was least sensitive to the presence of heavy metals. The other heavy metals would have to accumulate to concentrations of 10 ppm or more before being able to excert their toxic effect on corn.

WORKING GROUP 7

HEAVY METALS CONTAMINATION OF DIFFERENT VEGETABLE PLANT SPECIES IN EGYPT

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ABSTRACT

Different sites in cultivated area located at Kafr El-Dawar city, Egypt, adjacent to various sources of pollution were selected to study the contaminations of different vegetable plant species.

The results showed marked accumulation effects of the heavy metals in most vegetables grown on the investigated area. The different plant species showed different susceptibility for metal absorption through their leaves.

The total amounts of Cu, Mn and Zn in plant leaves ranged from 7.6 (Radish) to 50.1 (Egg plant) mg/kg dry matter, 38 (Radish) to 476 (Parsely) mg/kg and from 17 (Radish) to 168 (Celery) mg/kg respectively. While they varied between 1.6 (Cabbage) to 43 (Parsely) mg/kg, 7.9 (Squash) to 43.2 (Jew's mallow) mg/kg, 2.4 (Hot pepper) to 70 (Jew's mallow) mg/kg and 0,02 (Cabbage) to 0.10 (Radish) mg/kg for Ni, Cr, Pb and Hg respectively. Most of the vegetable plants showed a cumulative effect (I_t) and relative pollution hazards (RPH) of Cu, Zn and Ni which mark the onset of toxicity. Also possible injuries in vegetable plants (concentration index, C_i) were obtained.

WORKING GROUP 4

DETERMINATION OF THE TOTAL CONTENTS AND THE AVAILABILITY OF ELEMENTS IN A FOREST SOIL BY INSTRUMENTAL NEUTRON ACTIVATION ANALYSIS

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ABSTRACT

This work was undertaken as part of a project about the relationships between the atmospheric deposition, the Norway spruce, and the soil in a forest.

Soil samples were taken from 39 sites, from which three horizons were sampled.

The total contents of about 30 elements were determined in samples of 100 mg by means of three consecutive irradiations followed by the corresponding γ-spectometric measurements. The range of concentrations found was very large: 10^5 - 10^4 (μg of element /g of soil) for Al, Ca, Fe, K an Mg; 10^4 - 10^3 for Na and Ti; 10^3 - 10^2 for Ba and Mn; 10^1 - 10 for Ce, Cr, Ga, La, Rb, U and Zn; 1 - 10^{-1} for Au, Eu, Hg and Ta.

It must be noted that the direct analysis of the soil by neutron activation allows to determine the real, total contents. In contrast, methods based on the analysis of an acid leachate (2M HNO_3, for example) depend upon the extractability of the elements. Hence, these results are necessarily too low for most elements.

The available elements were determined by extracting 1 g of soil with 10 ml of an acetic acid - ammonium acetate buffer of pH 4.65 and 0.02 M in EDTA. The extracts were evaporated and then analyzed as the soil samples above.

The extracted fraction was 30 - 60% for Ca, Eu and Mn; 20 - 30% for Br and Sm; 10 - 20% for Ce, Co, La, Sc, Th and Zn; 3 - 10% for Ba and Mg; 1 - 3% for As, Cs, Fe, Na, Rb and V; and 0.5 - 1% for Al, Cr, Hf and K.

These results will be discussed in terms of precision and accuracy, and they will be compared with those obtained by atomic absorption spectrometry.

WORKING GROUP 11

^{14}C-LABELLED AUXIN MOVEMENT IN THE VASCULAR SYSTEM OF RICINUS

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ABSTRACT

Auxin is present in phloem saps at concentrations which may be considered physiologically active, presumably accumulating in response to the high pH of the phloem by an acid-trap mechanism. In contrast xylem saps do not contain auxin in significant amounts, earlier reports of auxin activity in xylem sap reflecting bacterial contamination. Auxin distribution within the plant is the converse of that for tryptophan, with high auxin concentrations in the young leaves whilst tryptophan levels were highest in mature and senescing leaves. ^{14}C-labelled auxin readily enters and is transported through the phloem when fed to a source leaf. Synthesis of auxin from ^{14}C-labelled tryptophan also results in auxin movement through the phloem. The implications of these observations on auxin distribution within the intact plant and the effect of these distributions on the functioning of sink tissues will be discussed with respect to the transport of photoassimilates.

WORKING GROUP 5

INVESTIGATIONS ON THE TRANSFORMATION AND BALANCE OF FERTILIZER NITROGEN UNDER THE CONDITIONS OF LEACHED CHERNOZEM-SMOLNITZA (MICRO-FIELD TRIAL WITH ^{15}N)

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ABSTRACT

A four years micro-field fertilizing trial with rotation of maize and wheat (within a 17-years field fertilizing trial for investigating the effect of continued mineral and organic-mineral fertilizing on the nitrogen balance) was carried out. The transformations in the soil, the uptake by the plants and nitrogen balance of ammonium nitrate marked with ^{15}N under the conditions of leached chernozem-smolnitza were studied. Bottomless pots with dimensions d = 40 cm and h = 60 cm were driven into the soil without disrupting its structure under the following variants of field fertilizing trial: PK, PK + N, and PK + N + manure (manure was applied in maize only). In the pots the mineral fertilizers were applied in quantities equal to those applied in field fertilizing trials: P = 140 kg P_2O_5/ha, K = 120 kg K_2O/ha and N = 200 kg/ha. Marked ammonium nitrate ($^{15}NH_4\,^{15}NO_3$ with 40.2 excess atom-% ^{15}N) was applied before sowing in maize only.

The data reveal considerable variations in the values, featuring the transformation of fertilizer nitrogen and the main items of the nitrogen balance - nitrogen utilization coefficient, immobilized in the soil fertilizer nitrogen applied in maize on the follower crop in the crop rotation - wheat, was also studied and the total balance for the four year period of the trial was accounted.

WORKING GROUP 5

NATURAL ^{14}C AND ^{13}C DISTRIBUTION PATTERNS AND ORGANIC MATTER DYNAMICS IN ALFISOLS

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ABSTRACT

With the thin layer sampling method and by measuring the natural abundances of ^{14}C and ^{13}C a variety of soils were investigated regarding the dynamics of the organic matter. The influence of soil order, climate and management practices on the depth distributions of the isotopes were studied. The soils comprise Alfisols, Vertisols, Ultisols, Mollisols and Inceptisols. The climates range from semiarid tropics to humid to mediterranean climate.

While in the agricultural soils plowing leads to a uniform isotope concentration in the topsoil, in the forest soile $\delta^{13}C$ rises with depth, due to decomposition and translocation of decomposition metabolities. Constant $\delta^{13}C$ values in clay enriched horizons reveal fixation of the organic matter with the clay. Descending $\delta^{13}C$ values with depth within the topsoil correlate with a change of cultivation from pulses to sorghum. A high biological activity and turnover of organic matter is shown by high ^{14}C abundances. In the argillic horizons the ^{14}C activity decreases with depth, which is the same as increasing radiocarbon age, in correspondence to the $\delta^{13}C$ results of clay fixation. Peak values of the ^{14}C activity reveal changes in soil texture and percolation dynamics of dissolved organic matter.

WORKING GROUP 7

STUDIES ON THE MIGRATION OF ^{137}Cs FROM THE REACTOR ACCIDENT OF CHERNOBYL IN SOILS IN THE REGION OF HAMBURG

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ABSTRACT

In the region of Hamburg 30 soil profiles have been sampled layerwise and measured by gammaspectrometry. The sites comprise forest as well as agricultural soils, different soil orders and texture.

From the results of ^{137}Cs and ^{134}Cs the depositions by the Chernobyl fallout and by the atom bomb tests of the fifties are calculated. The recent deposition of ^{137}Cs is between 1300 and 6300 Bq/m^2. The maximum of initial penetration of the isotopes into the soil was 15 cm. Few results of a later sampling indicate translocation processes. The possible reasons for the large variations of the results are discussed. For comparability of results between different laboratories a uniform sampling is recommended. The advantages of layerwise sampling are discussed.

Dose calculations amount to a maximum of 15 mSv accumulated over the next 50 years due to external radiation of ^{137}Cs and ^{134}Cs from the soil surface only. A more realistic estimation gives 0.3 to 0.7 mSv for adults and 0.7 to 1 mSv for pre-school children.

WORKING GROUP 1

IDENTIFICATION OF IRRADIATED PRODUCTS BY CHEMILUMINESCENCE

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ABSTRACT

Spices and dried vegetables (paprika powder, nutmeg, marjoram, black pepper, garlic powder, onion powder, camomile, parsley, cumin seed, celery (leaves and head) juniper berry, coriander, chanterelle mushroom) were irradiated with 7 or 10 kGy and the chemiluminescence of the samples was measured after irradiation upto 6 months.

The chemiluminescence of irradiated and unirradiated samples of horseradish, cardamom, carotta, garlic powder, onion powder, chanterelle, asparagus, coriander, celery and juniper berry, was measured as part of an international round investigation organized by the Institut für Strahlenhygiene, Neuherberg, FRG, to identify irradiated products.

The suitability of chemiluminescent measurment as a tool for identification of irradiation is discussed.

WORKING GROUP 3

IN VITRO CONVERSION RATE OF THYROXINE TO TRIIODOTHYRONINE IN THE LIVER OF MATURE HENS

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ABSTRACT

The oocytes of hens are able to concentrate iodothyronines. The triiodothyronine (T_3) is present in the yolk in the amount of about two times higher than in serum. Observations have shown that hen ovary is presumably not able to convert thyroxine (T_4) into T_3. The liver of fowls synthesizes the protein constituents of the yolk. One of them i.e. vitellogenin, serves as vehicle transporting iodohormones into the oocytes. There exists a possibility, that the yolk T_3 is of hepatic origin. Therefore, the next step of our scientific program is the conversion of T_4 to T_3 in the liver of laying hens and the effect of estrogens. The preliminary experiments are presented.

In vitro studies were performed on liver homogenates dissolved in TRIS-HCl buffer pH 7.4 to a final concentration ratio 1:3 and protein concentration 16.75 mg/ml (Lowry method). The iodothyronines were extracted from the homogenate by ice-cold 96% EtOH at a ratio 1:2, then estimated by a direct radioimmunoassay. The recovery of the exogenously added T_4 and T_3 was 84.6 and 112.6%, respectively. The data demonstrated that the conversion of T_4 to T_3 like in mammals is dependent on tissue concentration, time of incubation, presence of dithiothreitol (DTT) and concentration of substrate (T_4). The kinetics of conversion of T_4 to T_3 determined by Lineweaver-Burke analysis indicate an apparent Michaelis-Menten constant (Km) of 0.83 µmol/l with a maximum velocity (Vmax) of 1.54 nmol T_3 generated/min from T_4.

WORKING GROUP 1

STATUS OF FOOD IRRADIATION IN FRANCE

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ABSTRACT

1988 has been a very important year for food irradiation in France; new developments occured either in the research field or in the irradiation industry or at the legislation level.

About ten regional scientific teams are working at present on food irradiation. They are carrying research on the use of irradiation for preservation of different foodstuffs: red meat, fruits and vegetables, chicken, fresh fish, nut, cheese. Most of these research programmes are coordinated by the Ministry of Agriculture. On the other hand, the French Atomic Energy Commission is the only research centre carrying fundamental, basic and applied researches on food irradiation, in Cadarache. About 20 scientists are working there on three different subjects: analysis of free radicals, study of effects of gamma rays on plant cells and adjustment of the process for specific food products.

Two new industrial irradiation facilities have been built in France in 1988. Both of them are contract facilities, equipped with a source of high capacity (3 millions of Ci of Cobalt 60); they will irradiate either plastics or medical products and food. The first one is called "Amphytrion" and is located in Vendee (WEst of France) and will be in operation in November 1988. The second one is located in Marseille (South of France) and is managed by Gammaster Provence, the french subsidiary of Gammaster B.V.; it will be in operation early next year. The total number of facilities irradiating food in France will be 6 that is to say the highest number in the world.

Three ministries are concerned with food irradiation at the legislation level: Ministry of Agriculture, Ministry of Health and Ministry of Finance (Consumers Affairs). 11 groups of products are authorized to be treated by irradiation; most of them are dried or deep frozen products. New clearances have been asked for fresh products (fish, ham, cheese ...). About 4500 tons of products have been treated in 1987.
A new decree to be adopted by the french government has been sent for agreement to the EEC. This new decree will faciliate the procedure for giving the clearances and will adapte the legislation to the quick evolution of the process and will prevent the misuse of the process to guarantee the quality of this technology and of the quality of the treated foodstuffs.

Food irradiation is being recognized as a process like the others and more and more people either from the industry or from the government or from scientists or from the consumers are interested in this technology and ready to adopt it to guarantee the safety of our food supply.

WORKING GROUP 1

ELECTRON SPIN RESONANCE IDENTIFICATION OF IRRADIATED STRAWBERRIES

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ABSTRACT

Ionizing radiations generate free radicals in foods and as such, Electron Spin Resonance (ESR) could be used to determine whether irradiation has been used or not.

Induced ESR signals must be:
a) stable or fairly stable during the usual storage time of the foodstuff and
b) clearly distinguishable from the signals of the unirradiated sample, even after a long storage time.

As the water content of strawberry pulp varies from 88 to 93%, the radicals are not stable; they are quite stable in the achenes as the relative water content is less than 8 to 10%. The ESR spectrum of irradiated and unirradiated strawberries achenes is composed of three signals A, B and C:
- the A signal is a six lines signal due to Mn^{2+};
- the B signal increases with irradiation but varies in a more important way with the water content of achenes;
- the C signal, at about 30 G toward lower field from B line, is independent of achene water content and only observed in irradiated samples; C is coupled to a second line, only visible at high doses, but quite obscured by one of the Mn lines in the 1 - 3 kGy range.

The presence of C, as a peak or a shoulder, proves that the strawberries have been irradiated at a dose of at least 1 kGy.

Ionizing treatments are carried out at ~ 20 °C, with a 137-Cesium source (dose rate 3.5 kGy/h); the doses are mainly in the range 1 - 3 kGy, i.e. doses used to inactivate the moulds responsible for food losses. Seven varieties of strawberries (Douglas, Pajaro, Gariguette, Gorella and three unknown) bought in a supermarket have been studied; the storage lasted up to 40 days, at a temperature of ~ 5 °C. Achenes are cut from irradiated strawberries (with spring nippers or by grinding in water and filtering through a strainer with 0.8 mm diameter holes), then washed with water. In order to lower the water concentration in the ESR tube, the achenes are air dried (30 min) on filter paper or lyophilized.

If the storage times are not longer than 20 - 25 days, this test would prove whether gamma radiation has been used or not. Moreover, we have to point out that this test may become relatively general because a lot of fruits show this characteristic signal: raspberries, red currents, bilberries, cherries, apples, pears, figs, french prunes, kiwis, water melons, ...

WORKING GROUP 6

RADIATION MUTAGENESIS IN THE IMPROVEMENT OF TRADITIONAL MICROBIAL FERMENTATION OF CASSAVA

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ABSTRACT

Cassava (Manihot esculenta Crantz, M. utilissima Pohl) is a very important and cheap source of calories and provides a bulk of the diet for millions of poor people in tropical areas. Fifty million people in Africa derive more than 500 kcal per day from this crop. The major problem with Cassava and Cassava-fermented foods (African Garri, Fufu and their analogues in Asia and Latin America) is that they are almost exclusively starchy products with a little protein and contain a significant amount of toxic cyanogenic glucosides. Existing traditional fermentation processing of the cassava root does not appear to improve the nutritional value of the end-product. Moreover, the content of protein, some vitamins and minerals already low in Cassava may even be further decreased during the fermentation process. It is known that the long term consumption of such starchy diets in combination with low protein and high cyanide could lead to health hazards, such as syndromes called "tropical ataxic neuropathy" and "kwashiokor". Application of modern radiation genetic techniques (alone and/or in combination with existing gene engineering methods) holds promises for alleviating such problems through induction of specific mutant(s) with improved fermenting characteristics, such as high amylolytic ability, rapid growth on starchy bases, high linamarase activity, better yields of nutrient protein, desired amino acids, good taste/flavour production, among others. The preliminary results on the search for genetic improvement of some specific microorganisms involved in microbial fermentation of Cassava pulp have been reviewed at the first Research Co-ordination Meeting on the subject (IAEA, Vienna, 17 - 20 May 1988). Those results along with the feasibility of mutation induction, current molecular biology methods including recombinant DNA technique and biochemical analyses will be discussed in the paper.

WORKING GROUP 11

THE TRANSLOCATION OF ^{14}C-SUCROSE AND ^{14}C-BENZYLADENINE IN WINTER WHEAT (TRITICUM AESTIVUM L.) IN THE PERIOD BEFORE ANTHESIS

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ABSTRACT

The transport and distribution of ^{14}C-sucrose and ^{14}C-benzyladenine were studied in internode segments with ear of two winter wheat cultivars with a different mass of kernels in the period before kernel formation. In spite of a different distribution pattern, both substances were intensively taken up by the developing ear structures and first internode and ^{14}C-BA accumulated more intensively in the ear of the cultivar with higher mass of kernels. In this cultivar also a higher biological activity of cytokinins (zeatin and zeatin riboside) was found, mainly in the period of two weeks and one week before anthesis.

The results suggest that this higher biological activity of cytokinins of the cultivar with higher mass of kernels could be connected with a more intensive transport of these substances from growing root apices and could thus create in the ear a significant reserve for the early development of the ear.

WORKING GROUP 5

STUDIES ON THE ROLE OF SOIL BIOMASS IN THE SORPTION OF RADIOIODINE

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ABSTRACT

For a quantitative description of the mobility of iodine isotopes in soils the knowledge of the relevant parameters and their effects on iodine sorption are of major importance. As soil organic matter has been identified as a main acceptor substance for iodine, the participation of soil microorganism was suggested. However, because of experimental difficulties the clear separation of geochemical and biological processes remained unsatisfactory.

For distinction purposes between the two types of mechanisms experiments have been carried out with increased and decreased soil biomass. While the increase was achieved by the addition of glucose, the decrease was obtained by successive fumigations of soil samples (chernozem and podzol-brownearth) with chloroform. In order to quantify iodine mobility, the distribution coefficient (K_d-value) with ^{125}I was determined.

As a further proof for a microbial effect on iodine fixation incorporation experiments have been prepared with pure cultures of bacteria (Enterobacter, Bacillus and Penicillium) and of fungi (Thielaviopsis, Verticillium, Fusarium, Trichoderma and Penicillium) isolated from the soils. Radioiodine was applied to microbial cells of different densities either directly to the culture medium or to washed cells free of extraneous nutrients before contact with H_2O, NaCl (0.9%) or $CaCl_2$ (0.1 M)solutions.

The experiments showed a good correlation between biomass contents and K_d-values emphasazing the important role of microorganisms in iodine fixation. A considerable uptake of radioiodine was found in washed (NaCl and $CaCl_2$) cells with pure cultures of both bacteria and fungi, but no incorporation was detected into cells incubated in the culture medium. Future studies are directed towards further elucidation of the mechanisms of radioiodine biosorption. Especially the question whether iodine uptake is an active or passive process is of particular interest.

WORKING GROUP 2

EFFECT OF RADIATION TO PLANTS GROWN UNDER GREENHOUSE CONDITIONS

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ABSTRACT

Carrier-free radioactive phosphorus at the rates of 0.1, 5 and 10 µCi/100 gram soil was used to see the effect of radiation on vetch (Vicia sativa L.), rice (Oryza sativa L.) maize (Zea mays L.) sunflower (Helianthus annus Annuus) and barley (Hordeum vulgare L.). Plants were grown in greenhouse in pots containing 100 grams of Siverek soil collected from southeast Turkey. Plants were grown for one month and during this period germination rate, plant height and after harvest dry matter yields were recorded. According to the results carrier-free radioactive phosphorus rates (increase rates) affected the height of the plant to the extent of 14.4, 8.5, 11.0, 16.0 and 36.4 percent at 10 µCi rate in case of vetch, rice, maize, sunflower and barley respectively. The dry matter yield decrease at 10 µCi rate was 44.7, 59.1, 21.9, 24.7 and 38.8 percent for the above plants.

WORKING GROUP 6

MUTATION BREEDING TO IMPROVE TOLERANCE OF AZOLLA TOWARDS ALUMINIUM TOXICITY

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ABSTRACT

Azolla, a genus of floating water ferns, is widely distributed in aquatic habitats like ponds, canals and rice paddy fields in temperate and tropical regions. All species contain N_2-fixing blue-green algae/Cynobacteria named Anabaena azollae as an endophytic symbiont. Azolla-Anabaena associations are known to have an agronomic potential because of the rapid growth in nitrogen deficient habitats, and the high nitrogen fixation rate from the air with a total of 70 - 100 kg N ha^{-1} per paddy rice cropping season. Under optimal growth conditions the biomass can double within 2 - 3 days and maintain an N content of 4 - 6% of the dry weight with N_2 from air as the only N source.

Recently, the interest in this plant-algae symbiosis has been renewed by the demand for less fossil energy-dependent agricultural technology to replace nitrogen fertilizers. While traditionally grown as a green manure and bio-fertilizer crop for paddy rice in Viet Nam and the People's Republic of China, Azolla has also been used to feed cattle, pigs, ducks and fish. The fern's spread into more rice growing areas has been limited by stress factors affecting adversely productivity and thus its economic usefulness. As Azolla is suceptible to a number of insect pests and diseases, grows poorly under phosphorus deficiency, is sensitive to heavy metal toxicity and salinity, does not tolerate high or low extremes of temperature and is killed by herbicides commonly used to control weeds in rice paddies, genetic improvement is required to warrant its utility in rice growing countries.

Little is known about Azolla's natural genetic variability; its almost exclusive vegetative propagation may, however, limit Azolla's genetic flexibility.

Mutation breeding was thus initiated with the objective to induce increased genetic variation by irradiation with ^{60}Co gamma rays and to establish effective screening systems for traits of economic importance. Concepts for these studies and results on the induction, selection and confirmation of Azolla mutant strains tolerant to Al^{3+} toxicity at acid (pH = 4) conditions are reported.

WORKING GROUP 9

RADIATION DISINFESTATION OF FOOD PRODUCTS INFESTED BY THE ACARID MITES (ACARI: ACARIDAE)

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ABSTRACT

Acarid mites (Acaridae) are common pests in stored food products. They do harm by contamination of products with excrements, eating, warming and dumpening foodstuffs and also by infecting them with saprophitic microorganisms. There is a need for alternative for chemical pest control as a desinfestation treatment, and irradiation seems to be a new strategy.

Mites (Acari) are among the most resistant animals to the ionizing radiation, especially if the dose for killing was the basis for comparison. It was found that control males lived distinctly longer than treated males, but the longevity of control females and females treated with 0.26 or 0.35 kGy of gamma radiation was similar. At the higher doses, the treated mites of both sexes lived shorter than the controls. In general, longevity varied inversely with the radiation dosage. Irradiation of mites with 0.88, 1.06, 1.32, 1.58 and 1.85 kGy caused 100% mortality of adults after 30, 26, 21, 10 and 8 days respectively. Mites given a dose of 2.11 kGy were dead after 3 days.

The use of such high doses of ionizing radiation for direct killing the acarid mites may adversely affect the agricultural product and it would be expensive. Therefore, most desirable is a dose of radiation which prevents normal development and sterilizes adults. Sterility in the mold mites, Tyrophagus putrescentiae (Schr.) is achieved following irradiation of adult females and males at much lower doses than needed to kill adult mites. When both sexes were treated with a dose of 0.26 kGy or higher, mites produced several eggs which all were sterile (control hatchability = 96.0%).

Control of mite infestations in foods may be considered in the following general terms. For immediate lethality of the mold mites, T. putrescentiae, doses higher than 2 kGy of gamma radiation are required. Doses in the range of 1.3 to 1.5 kGy would be sufficient if lethality within a few weeks is the goal. A dose of 0.26 kGy would be effective if the goal is sterility of the living mites.

This study was supported by the International Atomic Energy Agency, Vienna, Austria. Research Contract No. 4659/RB

WORKING GROUP 9

IRRADIATION AS A QUARANTINE TREATMENT FOR BEANS INFESTED BY THE BEAN WEEVIL, ACANTHOSCELIDES OBTECTUS SAY (COL., BRUCHIDAE)

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ABSTRACT

Low dosages of gamma radiation affect the development of immature stages of the bean weevil, Acanthoscelides obtectus Say. A dose of 0.35 kGy is considered to be lethal for all larvae and pupae. At lower dosages, some immatures completed their development.

Radiosensitivity of the bean weevils decreased during their development, and adults seemed to be the most resistant stage for gamma radiation, especially if the dose for killing was the basis for comparison. A dose as high as 2.23 kGy did not cause immediate death of the treated insects; 100% mortality occured after 3 days.

The use of gamma radiation at dosages higher than 2 kGy for direct killing of the bean weevils would be expensive. Thus, the criterion for efficacy of radiation as quarantine treatment for beans infested with the bean weevils should be based solely on the inability of treated insects to perpetuate themselves at a new location rather than in causing immediate and complete mortality.

Of all stored product pests, the bruchids (Bruchidae) appear to be the most sensitive to sterilizing action of ionizing radiation. It was confirmed that a 0.06 kGy dose was the sterilizing dosage of gamma radiation for the bean weevil. However, various sterilizing doses for A. obtectus have been determined by different investigators. This considerable variation in results on sensitivity of the bean weevil to ionizing radiation seems to be caused by many factors, including age, sex, strains, food, temperature, humidity, type of radiation, dose rate, and dosimetry. Anyway, most investigators agree that males and femalses of the bean weevil irradiated with 0.15 kGy under prevailent conditions would be sterile.

Irradiation of beans infested by the bean weevil at 0.15 kGy could be the treatment required to produce an acceptable level of quarantine security. At this dosage, adult survivors of the pest will be present in the treated beans but they will not give rise to offspring.

WORKING GROUP 4

TRACE AND MINOR ELEMENT DETERMINATION IN SOIL AND PLANT MATERIALS BY NEUTRON ACTIVATION ANALYSIS

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ABSTRACT

Instrumental neutron activation analysis is an efficient tool for qualitative and quantitative analysis of minor and trace elements in plant matrix materials. As chemical pretreatment of the sample material in the laboratory before analysis can be avoided, sample handling and sample processing before irradiation can be cut down to a minimum, consequently minimizing danger of sample contamination by materials from the laboratory environment. In most cases plant materials are favourable matrices regarding activation by thermal neutrons. Fate and pathway of minor and trace elements are of interest in soil-plant relationship investigations. As an example for this type of studies, the pathway of minor and trace elements during growth and processing of sugar cane was investigated using instrumental neutron activation analysis. Samples were taken from surface and deeper layers of soil in sugar cane growing areas from sugar plant materials, and from the raw materials during different steps of sugar cane processing. Such samples were collected from five areas and sugar cane factories in Egypt (Armant, Kom Ombo, Edfu, Deshna, and Naga Hammady). Neutron activation analysis was applied for the determination of 18 elements in sugar cane processing samples and 30 elements in soil samples.

Another investigation related to Egyptian soil samples dealt with the determination of trace elements in Nile water and sediments from Aswan High Dam Lake. In former times these trace elements had been supplied regularly to the soil of the Nile valley region during the high flood. Investigations related to minor and trace element content of soil to supply data for soil science and agricultural research may be useful for the present and future agriculture of the Nile valley region.

During all our investigations, instrumental neutron activation analysis was carried out using the irradiation facilities at the TRIGA Mark II Reactor of the Atominstitute, and the slow and fast pneumatic transport and irradiation systems. The fast irradiation and transport system was especially useful for the production and determination of radionuclides with half lives shorter than one second.

WORKING GROUP 9

GENETIC SEX SEPARATION IN THE MEDFLY, CERATITIS CAPITATA: RESPONSE OF T:Y(WP$^+$)30C TO WILD-TYPE CONTAMINATION UNDER LABORATORY CONDITIONS

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ABSTRACT

The genetic sexing strain T:Y(wp$^+$)30C in the medfly, Ceratitis capitata, has remained stable throughout 40 generations of laboratory rearing. This strain results in the production of brown male and white female puparia. During mass rearing of this strain in 1987 a low level of aberrant females from brown puparia was observed in generations 6 to 7. By generations 10, this level had reached 6.9% females from brown puparia, of which one third reproduced. Computer simulations suggested contamination as the cause of breakdown. In order to verify this, experimental cages of T:Y(wp$^+$)30C were set up and contaminated with known frequencies and sexes of wild-type flies. The egg hatch, the frequency of aberrant types, and the sex- and pupal colour ratios were recorded in each generation. Results of this experiment will be presented and discussed.

This work forms part of a Joint FAO/IAEA Division programme on the development of genetic sexing mechanisms for the Mediterranean fruit fly, Ceratitis capitata (Wied.).

WORKING GROUP 1

THE SUPRAOESOPHAGEAL GANGLION AS AN INDICATOR OF IRRADIATION TREATMENT DURING QUARANTINE FRUIT INSPECTION

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ABSTRACT

Before a wide implementation of irradiation treatment for quarantine purposes may be contemplated, methods need to be developed to determine medfly, Ceratitis capitata (Wied.), as a model insect to assess postirradiation changes which may be used as treatment indicators for quarantine inspection purposes. Medfly eggs were collected over a 2-hour period and gamma-irradiated at various dosages at a mean age of 4, 24, 42 and 54 hours and as larvae at 72 and 112 hours. Surviving individuals were dissected as were measured. The area of the supraoesophageal ganglion and proventriculus were measured. The area of the supraoesophageal ganglion was significantly reduced after irradiation treatment, the degree of this reduction being related to the dose applied. A log dose/log area regression analysis showed a significant correlation between dose and ganglionic area at all stages except 4-hour old eggs. No reduction in proventricular size was observed throughout the experiments, the size of this organ reflecting merely the physical size of the larva from which it originated. When correcting the size of the supraoesophageal ganglion for that of the proventriculus a highly significant correlation was observed with the dose of irradiation at all stages tested. The mean percentage size reduction at 150 Gy ranged from 57.3% (52 hours) to 74.6% (72 hours). The implications of these data to quarantine control are discussed.

This work forms part of a Joint FAO/IAEA Division programme on the use of irradiation as a plant quarantine treatment.

WORKING GROUP 5

UTILIZATION OF ISOTOPIC ANALYSES OF PLANTS FOR DETERMININGTHE THE COEFFICIENT OF N AVAILABILITY FROM NITROGEN FERTILIZERS

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ABSTRACT

Results of experiments carried out in the 1966 - 1987 period on the efficiency of many fertilizers labelled with ^{15}N are reviewed.

In different soils the following coefficient of N availability were found:

- simple ionizable fertilizers - NH_4Cl 45 - 49.9%, $(NH_4)_2SO_4$ 36.4 - 67.1%, NH_4NO_3 25.8 - 32.0%, $(NH_4)_2HPO_4$ 31.2 - 50.3%, $NaNO_3$ 51.1%, KNO_3 64.7 - 76.4%;

- slow release N fertilizers - ureaform 10.0%, IBDU 26.6 - 60.5%, CDU 33.5%, Oxamide 50.3 - 56.8%;

- urea adducts - urea nitrate 31.0 - 59.8%, urea phosphate 48.4 - 86.2%, urea succinate 23.0%, urea formiate 33.7 - 80.3%;

- other organic compounds - urea 26.6 - 48.9%, cyanoguanidine 60.0 - 70.0%, phosphoryl triamide 30.6 - 42.9%, phosphonitrile hexamide 20.0 - 48.0%, glycoluril 56.9%, hexamethylenamine 48.5 - 52.5%;

- the nitrification inhibitor N-Serve and other inhibitors - $(NH_4)_2SO_4$ (56.1)+N-Serve 62.4%, Urea (39.8)+N-Serve 61.6%, urea nitrate (54.9%)+N-Serve 61.8%, urea phosphate (66.6%)+N-Serve 98.3%.

Efficiency in time of N fertilizers is low:

- simple ionizable fertilizers 0.10 - 0.80%
- slow release N fertilizers 1.2 - 4.54%
- urea aducts 10.0 - 20.0%
- organic compounds - urea 0.46 - 2.77%, urea+N-Serve 1.75 - 5.2%.

WORKING GROUP 7

WHEAT RADIOACTIVE CONTAMINATION IN THE ITALIAN TERRITORY WITH PARTICULAR REFERENCE TO THE PROVINCE OF PIACENZA AS A CONSEQUENCE OF THE CHERNOBYL ACCIDENT

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ABSTRACT

From radiocesium analyses on several samples of wheat from all over Italy, it can be stated that this species was one of the most widely affected by the radioactive fallout with an average value, referred to Cs-137 and Cs-134, of 196 Bq kg fw and a range between 16 and 729 Bq/kg fw. Only 0.77% of the samples examined shows a degree of radioactivity expressed as the sum of Cs-137 and Cs-134, exceeding the threshold of 600 Bq/kg fixed by the EEC directions.

This is particularly significant if we consider the important role that carbohydrates play in the Mediterranean diet.

The research was also made with a view to the variety type, the altimetric belt and the available potassium content of the soil within the province of Piacenza.

The radioactivity distribution on the basis of the altimetric factor shows a greater radiocesium absorption at lower altitudes as compared with the medium and above all the higher ones. These results are to be attributed to the different vegetation stage of the wheat at the moment of contamination, as a consequence of a climate difference due to altimetry.

The radioactivity differences observed in the various cultivars are inputable to climate factors again, rather than to gentic ones. In fact the cultivars in the plains - Irnerio, Adria and Gemini - show a generally higher level of radioactivity as compared to the ones in medium or high altitudes, such as Lontra and Aquileia. No correlation was observed between absorbed radiocesium and contentes of assimilable potassium of the soil.

WORKING GROUP 2

THE EFFECT OF PRESOWING LASER IRRADIATION OF SEEDS UPON THE PRODUCTIVITY OF CUCUMBERS GROWN IN UNHEATED PLASTIC GREENHOUSES

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ABSTRACT

In the period 1986 - 1987 a study was made on the effect of the presowing treatment of seeds from the cucumber cv. Gergana, grown in an unheated plastic greenhouse, with heliumneon lasers of 632.8 nm wave length and 25 mwt power (the equipment used was L'vov I Elektronika, made in USSR). The seeds of the variants investigated were subjected to laser irradiation once, three, five, seven and nine times.

The highest productivity was established with the seventime treatment of seeds, where the early yield increased on the average by 19.4% (17200 kg/ha), and the total yield - by 15.8% (20990 kg/ha), when compared to the control (untreated seeds).

In the treated variants the photosynthetic activity increased by 7.8 to 40.5%. As a result of it the amount of the synthesized dry matter per plant increased by 4.9 - 34.8%.

The laser irradiation of seeds led to higher plastid pigment contents in fruits and leaves, as well as to a higher amount ot total sugars and vitamin C in fruits.

WORKING GROUP 3

TWO MUTANTS OF VINE, RESISTANT TO DOWNY MILDEW, OBTAINED BY Γ-IRRADIATION OF SOMATIC MATERIAL

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ABSTRACT

In preceding meetings of ESNA the author has already pointed out the interest of the induced mutagenesis to vine breeding, concerning the resistance to downy mildew, employing radiation, particularly X and γ-rays. In this paper more recent results with γ-rays on the c.v. Touriga, a very typical variety of the Oporto region, are presented.

Doses of 0 (control), 500, 750, 1000 and 2000 rads were applied in cuttings with 3 buds and with doses of 0, 500, 750 and 1000 rads in herbaceous young branches from plants resulting from in vitro culture.

In the woody material, pronounced stimulation effect, for 500 rads, was observed on the growth of branches and on the total number of leaves. With 2000 rads almost complete inhibition was noted.

In spite of the low dosis used a mutagenic effect was detected. Two plants were selected as resistant mutants to downy mildew, one of them presenting in the leaves a "ring-spot" symptom, possibly related with a Phytoalexin system; the other, resulting from in vitro culture, presents necrotic patches.

Although their preliminary character, these results present already some practical interest.

WORKING GROUP 3

THE ANIMAL PRODUCTION AND HEALTH PROGRAMME OF THE JOINT FAO/IAEA DIVISION IN DEVELOPING COUNTRIES

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ABSTRACT

The Joint FAO/IAEA Division operates approximately 170 Research Contracts and Technical Cooperation programmes in over 50 Member States of FAO and IAEA. These programmes are aimed at assisting national universities and research institutes to develop the capability of solving practical problems related to the feeding and reproductive management of ruminant livestock and to the diagnosis and control of diseases. Some examples of these activities and of the mechanisms of support provided by the Animal Production and Health Section will be given through a short introductory lecture and a 15-minute film.

WORKING GROUP 5

MEASUREMENT OF N_2-FIXATION IN FIELD IN THREE SPECIES OF LUPINUS USING ^{15}N-LABELLED FERTILIZER

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ABSTRACT

Three species of lupinus (Albus c.v. Multolupa, Angustifolius c.v. Uniharvest, and Luteus c.v. Aurea) were planted in the field were they had never been planted before. The seeds were inoculated with each of four strains Rhizobium-lupini (LI8-C2, OR-14, IS-68 and L5-2). These treatments were compared with non-inoculated plants.

A low rate of ^{15}N-labelled ammonium sulphate (10 kg N/ha at - 10% excess ^{15}N) was added to inoculated plants to avoid interference with the symbiotic N fixation process, but a normal rate to the non-inoculated plants.

The amount of symbiotically fixed nitrogen was calculated - through the "A" value concept.

WORKING GROUP 3

RADIOIMMUNOASSAY OF MILK PROGESTERONE IN COWS AS AN AID IN THE EVALUATION OF OVARIAN ACTIVITY IN THE POST PARTUM PERIOD AND IN EARLY PREGNANCY DIAGNOSIS

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ABSTRACT

The long interval between parturition and first oestrus ("rest period") and between first oestrus and conception ("service period") affects the calving index of a herd and is the major source of loss to efficient dairy production. Therefore control of cyclic changes in the ovaries during the post partum period of cows is of great importance for successful dairy breeding.

In the present paper radioimmunoassay (RIA) of whole milk progesterone was used for this purpose, besides clinical examination of the cow's genitals. The investigation was carried out in 125 Friesean cows on a big cooperative farm near Belgrade.

The results obtained showed that 37.6% of the cows had ovarian luteal activity before 18 days after parturition (PG > 3.0 ng/ml), 44.8% up to 21 days, 60% up to 29 days and 68% up to 32 days. The rest of the cows (32%) without luteal activity up to this period (PG < 3.0 ng/ml) were treated with a synthetic analogue of prostaglandin $F_{2\alpha}$ (Estrumate, I.C.I.). After 3 days 10 of the 40 treated cows showed signs of oestrus, and were artificially inseminated (A.I.). In the remaining 30 cows a second dose of Estrumate was injected 11 days later. Only 8 of them entered oestrus and were A.I., remaining 22 cows were treated for infertility according to the clinical diagnosis.

Out of a total number of cows A.I. after spontaneous of Estrumate provoked oestrus, 43.7, 22.3, 12.6 and 5.8% become pregnant after I, II, III and IV A.I. respectively. The remaining 16% of cows were given therapy depending on the cause of their infertility.

Pregnancy was diagnosed by RIA of milk progesterone on day 21 and confirmed in 92% by recital exploration on day 40 after A.I. Eight percent of the cows returned to oestrus up to 40 days probably mostly because of embryonic mortality or low luteal activity of the ovaries.

A good correlation was found between clinical examination of the ovaries and pregnancy diagnosis and results of RIA progesterone.

WORKING GROUP 11

INDUCED RESISTANCE AND THE REUTILIZATION OF RADIONUCLIDES FROM BULBS TO DEVELOPING PLANTS

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ABSTRACT

Presowing gamma-irradiation of onion seeds with 30 and 50 Gy from ^{60}Co source induced plant resistance to subsequent inoculation of plants by Peronospora destructor, a downy mildew agent. The results suggest that acute gamma-irradiation act as abiotic elicitor of onion phytoalexins (tsibulins 1d and 2d) production whereby disease development is inhibited. Irradiation with doses higher than 70 Gy make M_1 progeny more resistant to downy mildew, but reduce percentage of emergency, yield and size ob bulbs.

Chronic gamma- and beta-irradiation of onion seedlings did not affect significantly their growth and survival. The growing of plants on soils contaminated with radionuclides (Gamma-background 1-4 mR/h) induce resistance to subsequent inoculation by other phytopathogenic fungi like Botrytis squamosa and Botrytis allii. Analysis of leaf segments sprayed by conidia suspension have revealed less damage in plants grown on soils with 1-4 mR/h. The backgrounds 8 mR/h and higher inhibits phytoimmunity reactions.

The quantitative measurements of the transfer of radionuclides from sowing-bulbs to developing plants were performed. The resistant bulbs from contaminated onion plants were planted in pure soils. Detailed studies shows that ca. 68% ^{90}Sr and 45 - 60% ^{137}Cs, ^{144}Ce have been reutilized from bulbs into growing plants. The radionuclides ^{137}Cs, ^{144}Ce and ^{106}Ru were accumulated preferably in leaves, but ^{90}Sr was concentrated to 60 - 80% in the roots. The addition of Ca^{2+} to soil promote its accumulation in reproductive organs and results in a decrease of ^{90}Sr contents in leaves per Ca^{2+} unit between 18 - 35%. Various sorbent materials employed to test the reutilization of radionuclides will be evaluated.

WORKING GROUP 4

SUPPLEMENT TO INVESTIGATION OF TECHNOLOGIC PROCESSES OF CAESIUM 134, 137 DECONTAMINATION OF BEEF AND LAMB MEAT

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ABSTRACT

The Chernobyl accident has drasticly created a problem of decontamination of animal meat produced from animals fed by contaminated green foods. Knowing Caesium 134, 137 to be a critical radionuclide for parenchymatose and muscular tissues, we decided to improve certain decontamination processess, applicable for a large scale use as was the necessity after the Chernobyl accident. In the experiments, we used the beef contaminated by radiocaesium 134, 137. Immersing beef in acetylsalycilyc acid combined with preasurized cooking, lessens the contents of radiocaesium by 89 - 93% compared to the initial saturation. We also used the process of fermenting lamb meat in sea salt as well as preasurized cooking, and obtained a 51 - 91% decontamination effect.

WORKING GROUP 11

TEMPERATURE AND AGE DEPENDANT ALTERATION OF WOOD PEROXIDASE AND AMYLASE ISOENZYMES IN QUERCUS ROBUR AND PICEA ABIES

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ABSTRACT

Branches (diameter about 1 cm) of Quercus robur (40 years old) Picea abies (15 years old) and Picea abies (4 years old) were exposed for different times (2, 4, 9 days) to different temperatures (+20 °C, +4 °C, -20 °C). Wood samples were analysed by electrophoretic separation of the peroxidase and amylase isoenzymes after the specific temperature treatment. Total enzyme activities were also determined by spectrophotometric measurements. Temperature and age dependent alterations of the electrophoretic patterns of isoenzymes were observed in Picea abies. Peroxidase and amylase isoenzymes of Quercus robur showed temperature dependent alterations. In all of the trees investigated increase or decrease of the overall enzymic activities can be found.

WORKING GROUP 7

THE UPTAKE OF HEXACHLOROBENZENE BY OIL-PUMPKIN PLANTS

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ABSTRACT

A series of experiments was conducted to examine the possibility of uptake of hexachlorobenzene (HCB) by plants of oil-pumpkin (Cucurbita pepo var. citrullinia f. styriaca Greb.).

Two open air pot-experiments were designed with the plants growing on soil in large containers of 50 l capacity. HCB was added to the soil in concentrations of 1, 2, 3, 20, 30 and 40 ppm. In a further treatment HCB was dissolved and sprayed on the pumpkin leaves differentiating according to leaf age and upside or bottomside of the treated leaves. HCB-concentrations were determined in oil of the pumpkin-seeds and in water extracts of the respective soils.

Pumpkin plants cultivated in solution culture were exposed to ^{14}C-labelled HCB applied via nutrient solution. In another experiment ^{14}C-labelled HCB was applied via atmosphere to the plants. In both cases the amount of radioactivity in plants was determined and from these data the concentration of HCB was calculated.

The experiments show that soil contamination even at low level causes a significant increase in seed HCB concentration. Higher quantities of HCB in soil caused no further increase of the amount of HCB in seeds. Moreover it could be pointed out, that HCB if sprayed on the leaves also was translocated to the seeds.

In the solution culture experiments HCB was found to be taken up easily via the liquid phase and translocated quickly to the youngest parts of the plant. Considerable amounts of gaseous HCB were taken up by the pumpkin leaves.

The results show the different ways of HCB-uptake by the oil-pumpkin plant. It was demonstrated that this pollutant follows an efficient distribution mechanism in the plant by which it is accumulated selectively in the oil containing seeds.

WORKING GROUP 7

USE OF CHERNOBYL FIELD DATA IN MODELLING CESIUM TRANSFER TO GRASSLAND CROPS

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ABSTRACT

The fallout of radioactivity released from Chernobyl in 1986 had to some degree contaminated field experimental sites in grassland crops. These experiments dealt with plant husbandry and fertilization problems but could as well be used for observations on the behaviour of cesium deposited prior to the start of the growth period.

It was felt that this material, earlier experimental data and other observations from the sixties could be utilized for modelling worksand for further studies on the behaviour of cesium after fallout. This study aimed at an understanding of the mechanisms working behind the observations made and of the reasons for the variations observed in the cesium transfer to the hay crops. The results suggest that the primary reasons for the varying transfer rates seems to have been the different interception capacities of the resting plant covers during the fallout, later during the season the availability for absorption by the growing plants of the intercepted material, the growth rate and the dilution by growth and to some extent the potassium content in the upper soil layer. From the field studies could be concluded that thin plant covers mostly occured on the clay soils, while dense covers occured on light soils. Out of the normal range were long term grassfields on often mineral deficient peat soils, where thick covers had been created by poor grass species.

WORKING GROUP 4

NEUTRON-ACTIVATION OF EU-TAGGED SOIL

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ABSTRACT

The possibilities to follow the transport of single soil particles (by erosion or bioturbation) or the persistence of soil aggregates was rather limited up to now. The main method has been microscopic investigation, which often fails because of the lack of unequivocal properties.

A new method based on neutron activation of tracers is introduced in this work. The soil to be labelled is mixed with ground glass, tagged with n-activable elements (usually Eu). After the experiment (e.g. erosion) samples are activated with thermal neutrons in a reactor and γ-spectra are taken.

Grain size (between 2 - 2000 µm) and density (between 2,4 and 2,8 g/ml) can be adjusted by varying grinding time and adding PbO into the glass. Tagging clay particles becomes difficult because in these small sizes the chemical resp. electrical surface properties become more important than size and density.

WORKING GROUP 5

SOIL SCIENCE RESEARCH ACTIVITIES IN JOINT FAO/IAEA PROGRAMMES

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ABSTRACT

Soils science activities in the Joint FAO/IAEA Programme focus on the applications of isotope and radiation techniques to research on soil factors which affect crop production in developing countries. Co-ordinated research programmes and technical co-operation projects are conducted on several research topics, and include: fertilizer management practices of various cropping systems, various aspects of biological nitrogen fixation by Azolla, pasture legumes, grain legumes, and tree legumes using ^{15}N techniques; comparison of neutron moisture meters with more traditional methods of measuring soil water; and amelioration of salt affected soils using salt tolerant plants. Projected programmes are to examine genotypic variation in water use efficiency and phosphate uptake, and these will have a high component of studies on root activity and plant physiology. In connection with the FAO fertilizer programme, research is being conducted on reactivity of different rock phosphates and on genetic variation in P uptake from rock phosphate. Approaches used in these programmes and key results will be presented.

WORKING GROUP 7

LEACHING OF ^{60}Co and ^{134}Cs FROM THE ROOTING ZONE OF AN EXPERIMENTAL FIELD

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ABSTRACT

In 1982 sandy soils of several experimental plots were contaminated homogeneously (20 cm layer) with ^{134}Cs and ^{60}Co, to study, on the one hand the transfer factors from soil to plant (ageing effect on the transfer) and on the other hand the leaching of these radionuclides from the rooting-zone in field conditions.

By the mean of a draining- and a pumpsystem the leached water has been collected and the concentration of the two radionuclides measured by gamma spectrometry.

The results obtained with ^{134}Cs in 1985 and 1986 show that the percentage of radioactivity leached from the soil is very low: respectively 0.08 ± 0.03 and 0.07 ± 0.05.

In the case of ^{60}Co the percentage of leaching is generally higher by an order of magnitude than for ^{134}Cs.

Results of leaching obtained in 1987 will also be presented.

WORKING GROUP 1

COMBINED EFFECT OF IONIZING RADIATION PLUS HEAT TREATMENT ON SPORES OF CLOSTRIDIUM SPOROGENES IN CANNED LUNCHEON MEAT

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ABSTRACT

Studies were performed to investigate the effect of combinations of mild heat treatment ($F_0 \sim 0.5$) and gamma radiation (4 kGy) on the microbiological stability of canned luncheon meat inoculated with spores of Clostridium sporogenes. The effect of heat treatment plus irradiation and that of a combination of the reversed sequence were studied. For quantification of the combined effect of the sporocide physical treatments and the inhibition of the survivors by the antimicrobial chemical factors (reduced a_w, nitrite, suboptimal pH) of the product, the method prposed by HAUSCHILD et al. (J. Food protection, 48, 1985, 197) was followed. Storage studies demonstrated the increased efficacy of combination treatments against bacterial spores. Pre-irradiation followed by heat treatment resulted in higher spore damage/inactivation than the opposite order of treatment. It is estimated that the number of safe packages may be increased in the experimental batch treated by 4 kGy irradiation plus $F_0 \sim 0.5$ min heat treatment than that of the batch which has been heat-treated only.

The studies have been sponsored by the Central Food Research Institute, Budapest, Hungary.

WORKING GROUP 1

FURTHER EXPERIMENTS ON THE DETECTION OF IRRADIATION OF DRY FOOD INGREDIENTS BASED ON STARCH DEGRADATION

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ABSTRACT

Following the preliminary experiments reported at the previous annual meeting of ESNA, storage studies were performed on ground black pepper samples of various water activity levels, either unirradiated or treated with gamma radiation doses of 4, 8, 16 and 32 kGy, respectively. Subsequent to irradiation, the samples were stored for 100 days at room temperature and relative humidities in equilibrium with their respective moisture content (25%, 50% and 75%, resp.) and the apparent viscosity of the heat-gelatinized suspensions of the spice powders was measured periodically during storage by rotational viscosimeter. Considerable decreases of viscosity were observed at each ERH-level as a function of radiation dose, and during the entire storage period statistically significant differences remained detectable between the untreated samples and those irradiated with 8 kGy or higher doses. Probably due to the activity of amylolytic enzymes, the apparent viscosity of high-moisture (75% ERH) untreated samples was gradually decreasing during storage, which decreased the difference between the respective untreated and irradiated samples at this humidity level.

Other analytical studies including spectrophotometric determination of damaged starch, reducing sugar content, water soluble solids content, and alcohol-induced turbidity of hot water extracts showed also an increased starch damage in irradiated samples. These indices, however, have been changed less dramatically by irradiation than the apparent viscosity of the gelatinized suspensions.

Viscosimetric studies were also performed with a number of untreated pepper samples of various origin to estimate the "natural" variation in black pepper. Besides black and white peppers, preliminary studies on nutmeg and ginger showed, too, that after further refinement and standardization, and coupled with counting the viable microorganisms in the samples, the study of rheological properties of heat gelatinized suspensions may become a simple way to detect radiation-decontaminated batches of those spices which contain relatively large amounts of radiation-degradable starches among their chemical constituents.

The studies have been sponsored by the Central Food Research Institute, Budapest, Hungary.

WORKING GROUP 7

LONG TERM PESTICIDES INFLUENCE ON WOMEN WORKERS HEALTH CONDITION

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ABSTRACT

The group of 36 female workers exposed to pesticides during the packing process was chosen for studying the chronic pesticide influence. As control group 30 unexposed female workers were selected. Average years of exposed were 36 and the average occupational exposure was 8 years.

In findings asthenovegetative syndrome was most frequently noticed. Also, the rate of gynecological disturbances, especially spontaneous abortions, was significantly high. Biotoxicological analyses are showing some abnormalities, too.

Assuming that this is just the beginning, further investigations are requested.

WORKING GROUP 5

STUDY OF FERTILIZER NITROGEN (N-15) UPTAKE UNDER FIELD LYSIMETER CONDITIONS DURING THE GROWTH OF MAIZE

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ABSTRACT

Investigations of the use of nitrogenous fertilizer enriched with N-15 are considerably developed in the soil-plant system under specified agroecological conditions. Such investigations make it possible to follow up the efficiency of the uptake of the applied nitrogenous fertilizer by the plant, the conservation and leaching in root zone, the immobilization and denitrification.

A field experiment was carried out in two lysimeters on chernozem (area app. 4 m^2 each) treated with 130 kg N/ha, 90 kg P_2O_5/ha and 70 kg K_2O/ha. The nitrogenous fertilizer was in the form of urea enriched with 10% N-15; phosphorus was applied as superphosphate, and potassium as KCl. The density of maize plants was 21 plant/lysimeter (54000/ha). Using a tensiometer, the potential of moisture was examined at 30 and 60 cm depth in a lysimeter. The maize variety ZP-SK-704 was sown at the beginning of May. Throughout May, June and the first half of July, no watering was carried out. During the second half of July, August and the first decade of September, lysimeters were watered with 80 l (Lysimeter I) and 40 l of water (Lysimeter II) twice a week. Agrimeteorological parameters were measured, such as the air temperature, the precipitation, the relative humidity. In the mature phase, the plant mass was cut separately: grain, leaf, stalk and cob, for determination of the total N%. The isotopic ratio N-14/N-15 was determined on a mass spectrometer (CEC 21-620 A, California, USA). Based on the acquired data the efficiency of the fertilizer nitrogen uptake by maize plants was evaluated. The results showed that the first lysimeter had better moisture regimen and a higher uptake efficiency of maize plant mass, reaching 30.4% (Lysimeter II: 24.5%).

WORKING GROUP 9

GENETIC AND ELECTROPHYSIOLOGICAL STUDIES ON PYRETHROID RESISTANCE IN THE MOSQUITO AEDES AEGYPTI L.

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ABSTRACT

In Aedes aegypti the resistance gene $R^{DDT2:py}$ which confers reduced nerve sensitivity to pyrethroids and DDT, is located provisionally at position 50 on chromosome III. This locus has not, however, been determined precisely with respect to flanking markers because of the difficulty in dealing with resistance as a phenotype when assessed as a population property.

An electrophysiological technique has recently been developed to assess this type of resistance in individuals without killing them. It involves taking electrical recordings from an isolated leg which is subjected to topical application of permethrin. Using this technique it is planned to obtain a pure homozygous strain and to map the gene precisely with respect to closely linked electrophoretic markers and visual mutants. The eventual aim is to use recombinant DNA techniques to clone this gene in order to investigate its mode of action in more detail.

WORKING GROUP 7

RADIOECOLOGICAL PATHWAY OF ELEMENTARY TRITIUM AFTER ITS DEPOSITION INTO TOP-SOIL

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ABSTRACT

Elementary tritium HT is not only a nuclide released by present (reactors, reprocessing plants) and future (fusion reactors) nuclear technology, but can be used as a model substance for studying gaseous deposition. After its oxidation in the top-soil by microorganisms it dilutes in the water pool of the soil. The uptake of HT by the soil is quantitatively characterized by the deposition velocity. The HT diffuses into the soil, where the reaction sites are evenly distributed at least in the top soil. The space available for diffusive transport seems to be the limiting factor. An increase of the water content results in a decrease of the depovelocity.

The pathway of tritium after an accidental HT release has been studied after two releases in the open field in France and in Canada. HT was released under certain weather conditions and wind directions, samples of soil and plant were collected during the next hours and days.

The reaction product HTO can be quickly detected after its formation in plants, too. Small herbes take up HTO immediately, may be via the roots. Bushes and other larger plants take up HTO both via the water transport system of the plants as by an isotopic exchange between soil and leaf water. This has been confirmed by a double labelling using $H_2{}^{18}O$ water.

The isotopic exchange between soil water and air humidity, called reemission is an important step of the radioecological pathway of tritium. The reemission is in the range of some percent per hour. The HTO reemitted from the soil is an additional source of tritium not only by inhalation also for the human food chain. It can be taken up into the biomass of plants and may act as a direct precursor of biosynthesis.

WORKING GROUP 7

INCORPORATION OF ^{14}C PCP BY AQUATIC MACROPHYTES USE IN STUDIES OF POLLUTION BY PESTICIDES

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ABSTRACT

In this paper, we present methodological aspects to estimate the effects of pesticides on aquatic plants: uptake, accumulation and toxicity. Plants are the first trophic level of contaminated organisms in aquatic ecosystems. Botanical and ecological features of studied aquatic plants must be taken into account, roots, stems and leaves being separated pathways for xenobiotic substances. Roots are the principal way of uptake of these compounds for helophytes and free floating macrophytes. Acropete flux of absorbed substances is increased in emergent macrophytes as well as absorption is increased by direct penetration through leaves and stems in case of submersed plants.

Specific surface aspects of these organs have been studied and ist has been shown that the relative amount of senescent parts and the development of epiphyte covering influenced capacity of adsorption and absorption. Observations of immerged organisms have been carried out by electron microprobe. Mineral microanalysis of periphytic diatomae communities and of their host plant is also used to describe perturbation of the system.

Pentachlorophenol (PCP) is a wide spectrum pesticide used mainly as fungicide. We have used ^{14}C labelled PCP to quantify incorporation and translocation of the pesticide in floating plants Eichhornia crassipes, Lemna minor, Pistia stratiotes. In dark conditions, PCP remains active for several days at 0.1 - 1 ppm level in culture medium and may limit the growth of plants. Besides scintillation counting, we also used TLC-scanner counting to detect localization of labelled PCP in the whole plant. This methodology is available for other pesticide residues studies.

WORKING GROUP 7

THE AVAILABILITY OF DEPOSITED ^{137}Cs TO MAN

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ABSTRACT

Since the accident in Chernobyl the ECN at Petten determines monthly the ^{134}Cs and ^{137}Cs concentrations in a representative group of people in the North Western part of the Netherlands, while at RIVM the average ^{134}Cs and ^{137}Cs concentrations in milk of the Neterlands are determined. From a comparison of the calculated ^{137}Cs burden of man and the observed burden it can be concluded that the models, as used at RIVM, represent equilibrium systems quite well. When applied to dynamic systems the models take unsufficiently into account the delays which exist in the food chain. The $^{134}Cs/^{137}Cs$ ratios, both in milk and man, appeared to be until October 1987 close to a source term ratio of 0.5 at May 2, 1986. This indicates that for the whole period the Cs in the biosphere results from the recent depositions. From earlier investigations by RIVM it is known that the upper 20 cm of the soil contain 1500 Bq ^{137}Cs per m^2, resulting from atomic bomb test series while Chernobyl caused concentrations of 920 Bq ^{134}Cs per m^2 and 1800 Bq ^{137}Cs per m^2. When both Cs isotopes would have been available to the same extent much lower $^{134}Cs/^{137}Cs$ ratios would have been found. Event at the end of 1987 the influence of the earlier deposited ^{137}Cs is not yet apparent, one has to conclude the availability of the old Cs is much lower than of the recently deposited Cs. This is in agreement with findings of the IUR (International Union of Radioecologists) which also noticed a decreasing availability of ^{137}Cs in soil for plant uptake with time. Extrapolation of present data shows that the uptake from early ^{137}Cs fallout may be reduced to 10 percent indeed.

WORKING GROUP 1

EFFECTS OF IRRADIATION IN RELATION TO TERMS OF APPLICATION AND STORAGE CONDITIONS ON MARKETABILITY OF ONIONS AFTER LONG TERM STORAGE

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ABSTRACT

Horticultural R. and D. Centre has been doing investigations on application of irrdiation of onions to prolong their storage durability since 1979. One of the elaborated problems is the influence of the term of irradiation and storage conditions on marketability and quality of onions.

Three terms of irradiation were investigated in 1986 - 1988:

1 month after harvest (digging time), immediately after curing,
2 months after harvest,
3 months after harvest,

and three storage conditions:

cold store (-1 - 0 °C, 85 - 95% RH),
common storehouse with gravitional, natural ventilation (5 - 16 °C in autumn and spring and 1 - 6 °C in winter, 70 - 90% RH),
house cellar (12 - 16 °C, 70 - 80% RH).

The dose was 0.06 kGy gamma and 0.06 and 0.12 kGy in the 3rd term of irradiation. Control onions were untreated.

Onions were stored during 8 months and, additionally, upt o 4 weeks in room temperature in order to simulate conditions of retail sale.

There were estimated systematically: weight percentage of marketable quality onions, rooting, sprouting, damages of dry scales, percentages of rotten bulbs and weight losses as well as darkening of inner buds, length of inner sprout, dry mass, vitamin C. Sensoric tests were also performed.

The investigations showed high efficiency of the irradiation method in sprouting and rooting inhibition. Results of storage of irradiated onions stored in storehouse were similar to cold storing, but when the whole handling process is taken into account, irradiation enables much better effects (about 30% more marketable onions). The best results were achieved when irradiation was applicated 1 month after harvest, but even in the third term effects were satisfactory, especially in high temperature storing. The darkening of inner buds didn't appear in cold store and was on low level in storehouse, even in case of delayed time of irradiation.

The dose of 0.12 kGy stimulated sprouting compared with 0.06 kGy.

WORKING GROUP 1

MARKET TESTS WITH IRRADIATED ONIONS IN POLAND IN 1984 - 1988

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ABSTRACT

Simultaneously with technological investigations on possibilities of onions irradiation in polish conditions, marketing experiments on consumer's acceptance of this method were performed.

Retail sales of irradiated onions, after their long term storage in natural cooled conditions have been organized by the Centre since 1984 in spring months. Onions were put on sale in 2 - 5 selfservice shops in Warsaw and Poznan up to an amount of 4 tons yearly. They were packed in 1-kg net bags. Short information and a questionnaire were enclosed.
The product was offered at normal price and labelled "Onions of prolonged durability by irradiation method" or "Onions treated with electromagnetic energy". Usual onions were on sale at the same time and differences of their quality were perceptible to shoppers.

The sale itself caused no problems and experiments were succesfull. Irradiated onions were sold in short time without any reclamation. Consumers were satisfied with the quality of the product and its durability after buying. Majority of them declared their willing to buy irradiated onions in future (about 95%), and, for the most part, systematically during the year.

At the time of experiments informations or reports in local newspapers and TV were inserted.

Results of market tests show that consumers in big metropolies in Poland don't feel aversion to the irradation method. They are not in opposition to it, in case when advantages of irradiation are evident.

WORKING GROUP 11

PHOTOSYNTHETIC ACTIVITY OF AWNED AND AWN-DEPRIVED RYE EARS

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ABSTRACT

Measurements of $^{14}CO_2$ fixation and amount of final grain yield in awned (control) and awn-deprived (4 days after ear formation) ears in various winter rye (Secale cereale L.) cultivars: Dankowskie Zlote, Wojcieszyckie, Kustro, Pancerne and dwarf one S_{25} were carried out. Depending on the rye cultivars, the awn dry matter amounted from 8.6 to 16.0% of the whole ear weight.

During flowering stage, the total radioactivity of awnless ears was 35 - 52% lower than that of the awned-ear plants, i.e. the removal of awns from ears resulted in a very distinct reduction of their photosynthetic activity.

It has been found out that in awnless ears the final kernel weight was 7.1 - 16.3% lower than that in the control. Thus, the awns take an important part in the increase of rye plant productivity.

WORKING GROUP 5

^{137}Cs - UPTAKE BY PLANTS FROM CONTAMINATED AUSTRIAN SOILS

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ABSTRACT

Pot experiments with two contaminated (Chernobyl) brown soils and a chernozem were conducted. The Cs-activity was mainly bound to the clay minerals. The specific activities of the texture fractions had the following ratio (mean of the two brown soils): sand: silt: clay = 1 : 0.43 : 13.3. The higher specific activity of the sand versus the clay fraction was explained by the high organic matter content of the fraction <63 µm. Because of the low sand content of the soils, the ratio of the absolute ^{137}Cs-activities in the texture fractions differed from the ratio of the specific activities: sand: silt: clay = 1 : 10.8 : 115.6. A humic acid extract (EDTA) contained on average 17.3% of the total ^{137}Cs-activity of the soils.

In the pot experiments the following mean transfer factors (FW/DW) were obtained:

Corn:	grains	0.0028 ± 0.0009	brown soil	(2098 Bq ^{137}Cs/kg)
	straw	0.0057 ± 0.0010		
Endivie:		0.0028 ± 0.0011	brown soil	(1735 Bq ^{137}Cs/kg)
Rye:	grains	0.020	chernozem	(33,3 Bq ^{137}Cs/kg)
	straw	0.048		

The transfer factors were hardly influenced by potassium- and magnesium-applications. NH_4NO_3-treatments increased the Cs-uptake by rye (grains and straw) distinctly.

WORKING GROUP 5

THE NITROGEN DERIVED FROM THE AIR IN THE PSAMMOSOIL-GROWN COWPEA (VIGNA SINENSIS, CV. JIANA)

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ABSTRACT

In order to replace part of the nitrogen of industrial origin applied to the agricultural crops grown on psammosoils with nitrogen of biological origin, the cowpea (*Vigna sinensis*) is one of the best leguminous crops as a stage in crop rotation due to its drought resistance and its high native ability to fix atmospheric nitrogen.

The authors report results obtained in two field experiments with cowpea using ^{15}N to quantify the amount of nitrogen derived from the air, soil and fertilizer as affected by increasing rates of nitrogen and magnesium fertilizers. The N taken up in the aboveground part of the crop was about 250 kg of N/ha, of which some 80 - 90% was derived from the air. Half the total nitrogen taken up by the cowpea plant is transferred to the grains. The percent recovery of fertilizer N was 4.4% irrespective of the rate of N applied. The rate of 30 kg of N/ha and 25 kg of Mg/ha applied at seeding to cowpea is beneficial for the crop, increasing the yield and dinitrogen fixation.

WORKING GROUP 4

THE EFFECT OF GAMMA RADIATION ON DIGESTIBILITY OF HIGH FIBER MATERIALS

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ABSTRACT

The application of gamma radiation appears to be one if the possible ways to improve digestibiliy of high fiber feeds. In the present experiments we studied the influence of gamma radiation on digestibility of rape straw and beech sawdust. For this purpose 4 sheep were kept in individual cages and fed twice a day in 12 hour intervals. The diet offered consisted of 600 g meadow hay and 300 g concentrate based on crushed grain. Experimental feeds were irradiated by ^{60}Co at 0 and 270 kGy in case of rape straw, and 0, 40 and 1100 kGy in case of beech sawdust. The treated roughages were weighed into nylon bags and incubated in the rumen for 2, 4, 6, 12, 24 and 48 hours after morning feeding.

It was found that gamma radiation changed composition of high fiber materials and decreased crude fiber content proportionally to the applied dose of irradiation. The highest doses of gamma radiation substantially increased dry matter digestibility of rumen incubated samples of rape straw and beech sawdust.

WORKING GROUP 3

RADIOIMMUNOASSAY KITS FOR DIAGNOSIS OF HERPESVIRUS INFECTIONS OF CATTLE AND SWINE

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ABSTRACT

Concentration of farm animals into large production units increase the risk of outbreaks and spread of infectious diseases. Rapid and sensitive diagnostic methods suitable for examinations of large sets of samples and therefore a prerequisite of effective therapeutic interventions and preventive measures are necessary. Infectious bovine rhinotracheitis (IBR) and Aujeszky's disease (AD) belong to topical and serious infectious diseases chaused by herpesviruses. For the diagnosis of these diseases highly sensitive ELISA methods are available. Based on the enzymeimmunoassay radioimmunoanalytical methods were developed and respective diagnostic kits are available. The development of the kits RIA-test-IBR and RIA-test-AD was motivated by higher sensitivity of radioimmunoassay. Use of these kits is beneficial mainly when large sets of samples are processed.

When compared with ELISA, titres of antibodies against IBR virus obtained by RIA were approximately 3 times higher. In the selected group of samples average antibody titres were 10.3, 3.823 and 11.584 for the neutralization test (NT), ELISA and RIA, respectively. Similarly, the average titres of antibodies against AD were 62.4, 7.660 and 21.860 for NT, ELISA and RIA, respectively.

The agreement of results between ELISA and RIA exceeded 95% in both cases.

WORKING GROUP 4

PRACTICAL APPLICATION OF CHLOROPHYLL FLUORESCENCE TO DETERMINE REDUCED PLANT PRODUCTION

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ABSTRACT

Chlorophyll of living plants emits a red fluorescence at 680 nm. With a flash-chlorophyll-fluorometer samples of fir needles, punched leaf disks from beeches or leaf tips of wheat or sugar cane can be measured.

Needle fluorescence of firs shows different phenomena in curves obtained after 30 flashes following a dark incubation compared to curves following a preilumination. This is due to different physiological conditions, which will be further explained in the lecture.

Fluorescence curves generated by a series of 30 flashes after 1 min preillumination can be used to identify leaves of "damaged" or not "damaged" beeches.

Leaf explants on agar and their measurements in Petri-dish-like cuvettes in the fluorometer show a correlation between increasing photosynthetic activity and an increasing amplitude of fluorescence yield-quenching.

The practical application of this technique to determine a reduced plant production will be described along with a series of Kautsky curves.

WORKING GROUP 5

BIOLOGICAL NITROGEN FIXATION RESEARCH AND TRAINING ACTIVITIES OF THE FAO/IAEA PROGRAMME

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ABSTRACT

The N-15 methodology for quantifying the amount of biologically fixed nitrogen by field-grown grain legumes was partly developed at the Agricultural Laboratory, Seibersdorf. This method has been used to measure nitrogen fixation in various other nitrogen fixing systems such as perennial pasture or forage legumes, Azolla and it is presently being adapted to leguminous trees. Furthermore current programmes emphasize the improvement of both yield and nitrogen fixation in grain legumes by the use of breeding, microbiological and agronomic methods. The training programme includes interregional or regional training courses and analytical or research fellowships. This presentation will give an overview of the use of N-15 to quantify biological nitrogen fixation with some examples of results obtained by the FAO/IAEA Programme.

WORKING GROUP 1

IDENTIFICATION OF IRRADIATED SPICES AND CONDIMENTS WITH LUMINESCENCE MEASUREMENTS: A EUROPEAN INTERCOMPARISON

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ABSTRACT

The result of the first collaborative study in 1985, which was not a real blind trial, has demonstrated that there is a good chance to identify irradiated spices by measuring the thermoluminescence (TL) or chemiluminescence (CL) if the method suitable for the spice is chosen.

Referring to this experiments a second intercomparison has been carried out between 12 laboratories of 4 European countries. For TL and CL measurements 10 different spices have been chosen each. 5 samples of each spice were sent to the participating labs of which 7 conducted both TL and CL investigations, 3 labs measured TL and 2 labs did CL measurements. For analysis each lab was asked to follow the same procedure. The only information they received, was the sample type and a statement that each group of 5 contained at least one irradiated sample (10 kGy) and an unirradiated one. Taking into account the different measuring equipments, the Federal Health Office as organizing Institute decided to send 4 natural standards of defined TL and CL intensity for laboratory intercalibration. This comprises that the light emission thresholds for differentiation between irradiated and unirradiated samples found in the former investigations could be used and extrapolated by each participant. To sum up some results, the study has proven that the TL in irradiated foodstuffs is a relaiable indicator. Most irradiated specimens could be clearly distinguished from the unirradiated ones. The TL technique enabled all 219 irradiated samples out of 450 in total to be identified. No unirradiated one was declared as irradiated. The CL identification is more limited because of a faster fading effect especially with horseradish, cellery and asparagus. The results obtained with cardamom, carotts, garlic, coriander, mushrooms, juniper berries and onions were acceptable. Two participants declared three unirradiated samples as irradiated but did not account for the standard deviation, which is sometimes quite large. Consideration of this deviation would mean that no fault has been made. With a total of 190 irradiated samples 70% have been identified by CL.

WORKING GROUP 11

HORMONAL CONTROL OF FRUIT GROWTH AND DEVELOPMENT

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ABSTRACT

During fruit development, qualitative and quantitative changes occur in the hormones present in the tissues. Fruit growth and development may also be manipulated by the application of plant growth substances. The involvement of hormones in fruit development will be reviewed using data from studies involving endogenous hormone analysis and applications of plant growth substances and inhibitors of hormone biosynthesis to seeded and parthenocarpic fruit and isogenic mutant lines. Potential sources of hormones present in fruit will be examined in detail.

WORKING GROUP 11

POTENTIAL FOR MANIPULATING GROWTH AND DEVELOPMENT OF SELECTED ARABLE CROPS USING XENOBIOTICS

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ABSTRACT

Tthe yield and harvestability of several arable crops may be improved by the use of plant growth regulators. The results of experiments using recently developed xenobiotics will be presented and discussed.

WORKING GROUP 11

MANIPULATION OF GIBBERELLIN AND STEROL LEVELS IN PLANTS USING XENOBIOTICS

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ABSTRACT

The availability of resolved enantiomers of certain plant growth regulators and fungistatic triazoles has enabled us to examine the effects of inhibiting gibberellin and sterol biosynthesis on plant growth and development.

Recent results from experiments in which the effects of applied paclobutrazol, nuarimol and γ-ketotriazole have been examined will be presented and discussed.

WORKING GROUP 5

MICRONUTRIENT DEFICIENCY STUDIES

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ABSTRACT

Occurence of micronutrient deficiency has been reported in numerous cases for most agricultural and horticultural crops. Recently, evidence could be obtained, that the micronutrient status of forest trees under certain conditions is insufficient. A connection with forest decline is discussed.

The present paper gives some examples of manganese-deficiency in a number of crops, as well as manganese - and zinc-deficiency in conifers of some austrian forest stands. Diagnosis was supplemented by chemical analysis of plant material.

Mn-concentrations (µg/g DM) in tissues of deficient crops with visible symptoms were the following in:

Peach leaves (3),
wheat (ear leaf 10, straw 9, grain 15, respectively),
raspberry leaves (13) and
strawberry leaves (9).

Norway spruce (Picea abies, L.) is generally insensitive towards high Mn-concentrations. The levels in older needles can increase up to more than 2500 g/g DM on acid soils. On neutral soils above dolomitic rock, especially when the climatic conditions are dry, spruce can develop chlorotic symptoms with Mn-concentrations as low as 3 µg/g DM.

On highly acid soils above granitic rock a depletion of nutrient cations due to long term input of acid precipitation is recorded. Spruce of these stands shows Zn-deficiency with Zn-levels in needles far below 10 µg/g DM. Low Zn-contents of spruce needles correlate with optical symptoms of forest decline, such as stunted growth, needle loss and low productivity.

WORKING GROUP 7

ENVIRONMENTAL POLLUTION: EFFECT IN WILD RODENTS LIVING IN TIBER RIVER AREA (ROME-ITALY)

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ABSTRACT

This research is a part of a survey performed with the aim of indicating in certain territories the "risk" and "control" areas, where the periodic monitoring of genetic damage must be carried out.

In this work wild Rodents were utilized as biological indicators of environmental pollution; the use of living organisms is increasing more and more as they, reacting to numerous environmental factors as a whole, may indicate where the environmental risk is high. The trapping was carried out near "Tiberina Island" in the Tiber river area (Rome), in the autumn of both 1985 and 1987; two mutagenic tests (bone marrow micronucleus test and sperm abnormalities assay) were applied on wild Rodents captured (26 ♂♂ and 19 ♀♀ Rattus norvegicus and 25 ♂♂ and 13 ♀♀ Mus domesticus) to analyze the cito-genetic damage in somatic and germ cells. Data of the percentage of polychromatic erythrocytes (MPE) and the sperm abnormalities was analyzed by Student's test; a significant increase of the averages of MPE ($P < 0.005$) and sperm abnormalitits ($P < 0.025$) was observed in the animals captured in 1985, besides the statistical significance of rats was pointed out. This data can be explained as the Tiber river is prevailing in the trophic and spatial niche of the R. norvegicus species. The results, obtained with the micronucleus test, are almost like those obtained applying the same method in the wild Rodents captured in the Tiber river area after the Chernobyl accident in the autumn of 1986. The possibility of river contamination from the wastes of the Hospital situated on the "Tiberina Island" and the consequences on the suburban agricultural areas situated downstream, were discussed.

WORKING GROUP 9

INHERITANCE OF PHOTOPERIODIC RESPONSES CONTROLLING DIAPAUSE IN SPIDER MITES (ACARINA: TETRANYCHIDAE)

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ABSTRACT

Photoperiodic reaction is a stable trait in the "Sambucus" (S) strain of the spider mite, Tetranychus urticae (Koch). The two nondiapausing strains, ND_1 and ND_2, were selected from S and established in the laboratory. From crosses between the nondiapausing and S strains it appeared that "diapause" trait is semidominant over "non-diapause". The suppression of diapause in ND strains is dependent on the operation of single recessive d_2 (in the ND_2-strain) or single recessive d_1 and extrachromosomal determinant(s) (in the ND_1-strain). Recessives d_1 and d_2 concern one and the same allelomorph. Alleles d are stored in S (if not in all populations) at considerable frequency. The follcwing genotype frequencies were found: DD = 81%, Dd = 18% and dd = 1%.

Loci a-p and d are distinct. Inheritance of the length of the critical photoperiod seems to be polygenic in T. urticae. Crosses between individuals of two separate geographically populations produced hybrid and backcross progeny with intermediate critical daylengths.

WORKING GROUP 9

THE FURTHER STUDIES ON SEX RATIO DISTORTION IN THE FLOUR MITE, ACARUS SIRO L. (ACARINA: ACARIDAE)

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ABSTRACT

Both males and females of the acarid mites (Acaridae) are diploid. Determination of their sex is of the type XX/XY or XX/XO with homogametic females. The sex ratio in these mites should in theory be 1:1.

Between-family variation of the sex ratio in the strain A8 of the flour mite, Acarus siro L., was studied in details. Progeny of 45 pairs of this strain consisted of 1613 ♀♀ and 1706 ♂♂; departure from an expected 1:1 ratio was not statistically significant. However, among the progeny of some pairs, cases of a significant distortion of the sex ratio were found. A measurable excess of females over males or the opposite situation has been observed in some families. A preponderance of females was highest in the family No. 5 (97% ♀♀), and this family was chosen for selection for the sex ratio distortion. Offspring of this family was allowed to inbred for 2 - 3 generations, and the substrain No. 5 established. About 60 pairs of this substrain produced 2745 ♀♀ and 1538 ♂♂, indicating factors which cause a departure from "normal" 1:1 ratio.

Progeny of some pairs yielding more than 70% females were inbred further and the respective lines were set up. After 2 - 3 months, the sex ratio of their descendants was recorded again.

The selection process brought about a further increase of the frequency of females. E.g., the mean frequency of females in families of the line No. 17 was a high as 83.2%. Not only frequency of females in the strain, but also the proportion of families with the female-biases sex ratios radically increased in relatively few inbred generations through the use of single-pair selection for high distortion.

These facts suggest that the sex ratio distortion in the flour mite in inherited. The mode of inheritance and type of gene action controlling sex ratio distortion cannot be determined from this study. However, the rapid early response to selection of the strain A8 indicates that a simple genetic factor(s) is underlying the distortion of the normal (1:1) sex ratio.

WORKING GROUP 9

USE OF IRRADIATION AS A QUARANTINE TREATMENT OF AGRICULTURAL PRODUCTS INFESTED BY ACARID MITES (ACARI: ACARIDAE)

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ABSTRACT

Agricultural products are imported commodities in international trade. However, trade of these products is seriously hampered because of mite and insect infestations. There is need for alternatives for chemical pest control as a quarantine treatment, and irradiation seems to be a new strategy.

The acarid mites are among the most resistant animals to the ionizing radiation, but sterility in these pests is achieved following irradiation of adults or immatures at much lower doses than needed to kill the mites.

When both sexes of the mold mites, Tyrophagus putrescentiae (Schrank), were irradiated, some pairs ceased egg-laying. The inhibition of egg-laying was more pronounced in the mites which were irradiated as 0 - 24 hour old adults than as 24 - 48 hour old adults. When both sexes were treated with a dose of 0.26 kGy or higher, mites produced several eggs (control 415 ± 110) which all were sterile. Therefore, irradiation of a product infested by the mold mites at 0.26 kGy could be the treatment required to produce an acceptable level of quarantine security. At this dosage, adult survivors of the mold mite will be present in the treated commodities, but they will not give rise to offspring, and thus this pest would not be able to perpetuate in a new area.

Irradiation of a product infested by the bulb mite, *Rhizoglyphus echinopus* (F. et R.) could be also the quarantine treatment. At this dosage, 0 - 2 day-old eggs did not hatch. Adult mites developed from irradiated (>2 day old) eggs were sterile; sex ratio of these adults was male-biased. Mites emerged from treated inert deutonymphs laid a few eggs which all were sterile. Fecundity of mites irradiated as adults was much lower (87%) than the controls, and larvae occasionally hatched (hatchability: about 0.2%) from eggs produced by these mites.

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WORKING GROUP 9

RADIATION BIOLOGY OF THE ACARID MITES (ACARI: ACARIDAE)

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ABSTRACT

Eggs, larvae, nymphs, and adults of the mold mite, Tyrophagus putrescentiae (Schrank), and the bulb mite, Rhizoglyphus echinopus (F. et R.), were treated with gamma radiation from cobalt-60. Immatures were allowed to develop to the adult stage, and fecundity and fertility of these adults were determined.

The age of eggs at the time of irradiation has a profound effect on their hatchability. Adults developed from irradiated eggs were unfecund or sterile.

No adults developed from larvae of T. putrescentiae irradiated with 0.35 kGy or higher doses, but some sterile adults did develop from treated protonymphs. These males and females lived shorter than the controls.

Of the inert protonymphs treated with 0.26 kGy, 85.3% reached the adult stage. Theses adults were sterile, too. Treatment of inert protonymphs with 0.7 kGy caused them to have difficulty with molting, or deutonymphs and adults that appeared soon died, often inside the molting skin.

Treated deutonymphs of the mold mite reached the adult stage even at 1.32 kGy. Mites emerged from inert deutonymphs treated with 0.26 kGy or higher dose were unfecund. At low doses, the fecundity and egg viability were significantly lowered as as compared to the control.

Adults are more resistant to the gamma radiation than the developmental stages. However, the fecundity of the acarid mites was greatly affected at a dose of 0.1 kGy or higher. It was found for the bulb mite that all eggs laid by mites irradiated with 0.5 or higher dose were sterile. A single larvae hatched from eggs produced by mite pairs treated with 0.25, 0.3 and 0.4 kGy. In these cases, the lethality of eggs was higher than 99.8%. Viability of eggs laid by 0.1 - 0.2 kGy treated mites was low during the first days after irrdiation; later on, it reached a rather stable level. This indicate a quick postradiation recovery in fertility by mites irradiated with low dosages of gamma radiation.

WORKING GROUP 9

INHERITED STERILITY IN THE ACARID MITES (ACARI: ACARIDAE)

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ABSTRACT

Substerilizing doses of ionizing radiation applied to adults of a number of insect species cause genetic damages that are transmitted to the F_1 generation, where they produce an increase incidence of sterility and a reduction in total progeny.

The sterilizing dose of gamma radiation for the flour mite, Acarus siro L., was found to be near 0.3 kGy. At the lower dosages, it was possible to obtain adult mites of the F_1 and F_2 generation.

Fecundity of the F_1 generation was significantly lowered as compared to the control. However, the F_1 females laid more eggs than their irradiated mothers.

The egg viability and productivity of A. siro females were higher in the F_2 generation than in the F_1. Also, the time of development from egg to adult stage was somewhat longer in most combinations of the F_1 generation. The percentage of viable eggs laid by the females of the F_1 and F_2 generations was variable, but it was always lower than in the control.

Males which were irradiated and then paired with untreated females and their male progeny sired fewer viable eggs than the untreated parental males paired with treated females and their descendants. The percent of eggs that developed to the adult stage was also lower in combinations involving offspring of irradiated males than in the cases where the parental females were treated. Thus, the males of A. siro are more susceptible to gamma radiation than the females are. Postradiation genetic damage to the sperm were apparently more severe than the damage to the ova in the F_1 and F_2 generations.

Results of the similar study with the buld mite, Rhizoglyphus echinopus (F. et R.) will be also presented.

WORKING GROUP 5

^{15}N STUDY ON THE INFLUENCE OF THE CROP AND NITROGEN FERTILIZER ON THE SOIL NITROGEN MINERALIZATION POTENTIAL

E. IKONOMOVA, R. BALABANOVA-GEORGIEVA and Z. LEMA

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ABSTRACT

With the use of ^{15}N, under the conditions of pot experiments and micro-field trials we study the influence of the crop and the form and rate of nitrogen fertilizer on the soil nitrogen mineralization potential of several soils, representative of the country: calcareous chernozem, leached chernozem and grey forest soil.

Several main crops for Bulgaria - wheat, maize, alfalfa and ryegrass, as well as the main nitrogen fertilizer forms, i.e. ammonium, nitrate and amide, are included in this investigation.

The labelled compounds: $(^{15}NH_4)_2SO_4$, $Ca(^{15}NO_3)_2$ and $CO(^{15}NH_2)_2$ were applied to the pot experiments; and $^{15}NH_4{}^{15}NO_3$ nd $CO(^{15}NH_2)_2$ to the micro-field trials.

WORKING GROUP 5

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WORKING GROUP 5

FIXATION OF $^{15}NH_4^+$-NITROGEN IN VARIOUS SOILS AND ITS AVAILABILITY TO PLANTS

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ABSTRACT

The fixation of ammonium ion in soils with various chemical and physical properties was investigated in this work. For this purpose a number of pot experiments was carried out with the following soils: chernozem, pseudogley, brown forest soil, smonitza and alluvium. Two kilograms of soil were placed in pots and 10 oat plants were grown for a period of two months. Ammonium sulphate (with 10.8% 15N) was used as a nitrogen fertilizer in two doses: 50 and 150 ppm N. The level of P and K was 40 and 50 ppm respectively. Lower dose of nitrogen (N_1) was also combined with the addition of wheat straw in the amount of 1.66 g per kg of soil. Experiments were carried out in three repetitions with and without plants.

A second set of experiments was performed in the same manner, but only on chernozem and pseudogley and with three types of nitrogen fertilizer: ammonium sulphate, ammonium nitrate and carbamide.

Different chemical properties of investigated soils and their mineralogical composition had significant influence on the fixation of $^{15}NH_4^+$ ion from added ammonium sulphate. Highest fixation was recorded in brown forest soil and smonitza (19 and 17% of added fertilizer) in the treatments without plants, while lowest fixation was in pseudogley (4%).

The so called "freshly" fixed ammonium nitrogen from added fertilizer was mostly (around 80%) utilized by plants and microorganisms, which points out to its significant availability. However, previously fixed $^{15}NH_4^+$-N in the investigated soils has undergone much smaller changes during the experiments, and this fact indicates that it is much less available in relation to "freshly" fixed $^{15}NH_4^+$-N. In soils with stronger fixation (brown forest soil and smonitza) the content of this form of nitrogen had slightly increased due to subsequent fixation during the duration of the experiment.

Comparison of various nitrogen fertilizers (ammonium sulphate, ammonium nitrate and carbamide) has shown that highest fixation of NH_4^+-N had occured when ammonium sulphate was applied as a fertilizer.

WORKING GROUP 1

SOME INVESTIGATIONS OF γ-IRRADIATED WHOLE EGG POWDER

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ABSTRACT

Food items contaminated with Salmonella pose a considerable risk for human health.

The use of ionizing radiation has been established as an accepted and widely performed method for Salmonella eradication of chicken carcasses.

On the other hand, there have been only scarce information about the feasibility as to irradiation of whole egg powder. Our investigations aimed at the determination of the highest dose causing no deterioration of flavour. Several sensory tests have been practised to evaluate the quality of the material before and after irradiation. Additionally, some chemical parameters (for example analysis of thiobarbituric acid reactive substances) have been studied.

Results of the sensory difference tests and of other experiments outlined in detail in the paper justified the application of 1 kGy for decontamination of the given charges of whole egg powder. The level of Salmonella being relatively low, so this dose proved high enough to get a wholesome product.

WORKING GROUP 5

ON USE OF OXYGEN-18 LABELLED PHOSPHATE IN SOIL AND PLANT RESEARCH

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ABSTRACT

At the ESNA meeting in 1987 we discussed the use of oxygen-18 (O-18) for labelling of phosphate to be used in plant and soil research. We also reported preliminary results of a pot experiment in which P-32 and O-18 labelled phosphate was applied to the soil and ryegrass was grown. These showed us that very little of the large excess of O-18 in the added phosphate was present in phosphate isolated from the first cut. Later analyses of the succeeding cuts showed that no O-18 excess in the phosphate extracted from the plants was detectable by optical emission spectrometry. These findings thus show that O-18 labelled phosphate taken up by a living organism quickly looses its label, i.e. the excess of O-18, by exchange with O-16 containing compounds (probably water) in the environment.

The experiment was terminated after 12 weeks and phosphate was extracted from the soil by means of anion exchange resin. The specific activity of P-32 and excess O-18 in this and the added phosphate were determined. It was found that the dilution factor for O-18 was twice as big as that for P-32, indicating that half of the excess O-18 in the added phosphate was lost by exchange with O-16 which probably took place in soil organisms and plant roots.

Outlook: Meaningful and informative plant experiments with O-18 labelled phosphate must be conducted on a time scale of minutes or hours rather than days. This may exclude soil-plant experiments while soil experiments are feasible and may be extended to months or even years. It is, however, essential to know if an exchange of O-18 and O-16 takes place in soil without plants, and if so, whether it is brought about by soil microorganisms or soil components.

Experiments appropriate to the above problem are in progress and results will be reported at the meeting.

If it is found, that no O-18 exchange takes place in sterile soil the use of O-18 labelled phosphate for the purpose of measuring microbial activity in soil will be investigated.

In conclusion: O-18 labelled phosphate may have potential in research with soil and plants.

WORKING GROUP 3

USE OF NUCLEAR AND RELATED TECHNIQUES IN ANIMAL DISEASE DIAGNOSIS WITH PARTICULAR REFERENCE TO RINDERPEST

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ABSTRACT

Disease diagnosis has traditionally involved the use of many different techniques to meet the complex requirements of the diagnostician. Recently tests have emerged which combine the advantage of versatility whilst retaining simplicity, sensitivity and low cost. At the forefront is the enzyme-linked immunosorbent assay or ELISA. This test which had its origins in radio-immunoassay technology does not itself contain a radioactive component although this is extensively used in its development.

One disease for which the ELISA is used is rinderpest. This disease is the most serious of the many diseases of cattle and continues to cause major losses in the African continent. In an effort to control and eventually eradicate the disease a PAN African Rinderpest Campaign has been initiated. Funded primarily by the EEC and involving over 20 African countries the campaign intends to control the disease through mass vaccination. To monitor the success of this a sample of the cattle population will be examined for the presence of antibodies to the virus which in turn will give an estimate of the level of vaccination being achieved. The test to be used for this will be the ELISA. This has already been used in several African countries and has been shown to be the only suitable system that can handle the number of samples envisaged (over 500,000 per year), work consistently in conditions found in African laboratories and operate at an acceptable cost. ELISA kits, the size of a shoe box for testing some 20,000 cattle are now issued through IAEA programmes to some 16 countries in Africa; these kits are prepared and distributed from the IAEA Laboratory, Seibersdorf, and the Animal Virus Research Institute, Pirbright, UK.

This is a clear example where a nuclear-related technique meets the needs of developing countries.

WORKING GROUP 3

PUERPERAL CHANGES OF THYROXINE AND TRIIODOTHYRONINE SERUM LEVELS IN DAIRY COWS

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ABSTRACT

Our previous investigations have shown that serum levels of thyroid hormones in dairy cows decline considerably after parturition. Serum triiodothyronine (T_3) and thyroxine (T_4) levels, amounting to 2,43 nmol/l and 65,4 nmol/l respectively during the last two months of pregnancy, dropped to 1,14 nmol/l and 22,6 nmol/l respectively during the first 15 days after parturition. Further study of the puerperal serum levels of thyroid hormones was aimed at establishing the precise time of hormone decline in an attempt to make this interesting phenomenon more clear.

In 4 cows T_3 and T_4 serum concentrations were determined about 15 days prior to parturition and the first day postpartum. The results of that experiment were practically identical with the previous ones, showing that T_3 and T_4 serum levels were not decreased at the time very close to parturition and that the decline was expressed immediately after delivery.

The last determination of T_3, T_4 and thyrotropin (TSH) serum levels was performed in 17 pregnant cows immediately prior to parturition and on the first two days postpartum. At the day of parturition 10 cows still had high levels of thyroid hormones (T_3 - 1,95 nmol/l and T_4 - 66,9 nmol/l). Their serum concentrations dropped the first postnatal day to 1,06 and 37,2 nmol/l respectively, the next day showing a further decrease (T_3 - 0,87 and T_4 - 33,0 nmol/l). In the remaining 7 cows low serum concentrations of T_3 and T_4 were observed before the act of delivery had taken place and were about the same 24 and 48 hours after parturition. Mean values of T_3 amounted to 0,96 - 0,88 - 0,90 nmol/l respectively and T_4 - 42,1 - 42,4 - 44,7 nmol/l respectively.

No puerperal variation of TSH serum level was observed. Mean concentrations in the first 10 cows amounted to 22,6 mU/l on the day of parturition, 22,9 mU/l the first postpartum day and 21,9 mU/l 48 hours after parturition; similar values were found in the other 7 cows showing T_3 and T_4 decline prior to delivery (22,8 - 22,9 - 23,9 mU/l respectively). The unchanged TSH values at the time of parturition indicated that puerperal variations of T_3 and T_4 serum levels were not induced centrally (hypothalamic-pituitary-thyroid axis). As the thyroid hormone decline is related to parturition but not directly provoked by this act, some mechanisms possibly involved are discussed.

WORKING GROUP 2

EFFECT OF LASER IRRADIATION ON INITIAL GROWTH OF SOME PLANT SPECIES

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ABSTRACT

Recently, a number of studies have been published, which emphasize the favorable effect of laser treatment on seed germination, growth and yield.

Considering the mentioned data as well as the fact that some economic and marketing organizations are interested in use of laser in agriculture, we began to investigate the effect of laser treatment on germination and initial growth of some plant species.

The laser treatment of air dry seed was performed with He - Ne laser beam with power of 20 to 50 mW and wave length of 630 nm. The treated seed of field pea, sugar beet, tomato, carrot, parsley, parsnip and cabbage showed different germineability. In most species, seed was treated once, twice and thrice, while in sugar beet, it was treated once, thrice and five times. In laboratory conditions, the energy of germination and germineability was analyzed on different temperatures as well as the initial growth of seedlings. In addition, we analyzed the effect of laser treatment on the accumulation of nitrogen, phosphorous, potassium, calcium and magnesium in the above-ground part and root of field pea in water culture.

On the basis of the obtained results, we may conclude that effect of laser treatment was different and depended both on plant species and variety and on frequency of treatments. In some species and varieties we determined an increase of germination energy, and an increased initial plant growth. The seed treatment with laser beam also affected the accumulation of particular elements. Considering that these experiments are only preliminary, we cannot yet give a definite answer to the question how the laser treatment affects the investigated parameters. However, the obtained results show that further investigations of this problem have to be done, although the probability of reproduction of the obtained effects is very small, which may be a limiting factor in application of laser irradiation in agricultural practices, as experience teaches us.

WORKING GROUP 5

Cs-137 UPTAKE AS TRANSFER (TF) INTO CEREALS IN RELATION TO PROPERTIES OF 17 SOILS

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ABSTRACT

The dependency of Cesium-137 uptake into plants from 17 different soils of the F.R. Germany and their physicochemical properties have been investigated. The measurements have been accomplished with biotests.

Genetically strongly varying soils of rather different soil properties were selected in the surroundings of nuclear power plants (Biblis, Gorleben, Jülich and Stade). The soils with their German and FAO classification as well as their properties, namely pH, organic substance, soil nitrogen, cation exchange capacity (CEC), exchangable calcium and potassium, respectively, were discussed.

For the biotest experiments solum material was used in small pots containing 500 g of soil each. The investigated plants were raised under standardized and continuously measured and partly controlled greenhouse conditions (air humidity, light, air temperature, maximum soil water capacity and fertilization).

The Cs-137 uptake by both cereals ($Bq.g^{-1}$ plant fresh weight and plant dry weight, respectively) as well as the transfer factors ($Bq.kg^{-1}$) plant fresh weight and plant dry weight, respectively, versus $Bq.kg^{-1}$ soil dry weight) were calculated. It will be shown that Cs-137 uptake as well as Cs-137 transfer factors of wheat and of barley which vary extremely, namely in a range of three decades, are functions of the soils.

Linear regression analyses between the Cs-137 plant uptake or Cs-137 transfer factors and the soil properties were performed.

In general the Cs-137 uptake by wheat or barley from 17 soils depends primarily on the pH of the soil. With decreasing pH the Cs-137 uptake increases and vice versa. The Cs-137 uptake generally correlates with the amount of medium sand. The proportion of medium sand proved to be an indicator for the Cs-137 uptake behaviour. It will be discussed why this two soil properties are of special importance for the Cs-137 uptake processes.

Cs-137 biotest experiments lead to similar results as Cs-137 sorption desorption studies.

To improve the validity of these predictions an even higher number of soils would be desirable.

WORKING GROUP 9

POLYTENE CHROMOSOME ANALYSIS OF TWO GENETIC SEXING STRAINS OF THE MEDITERRANEAN FRUIT FLY, CERATITIS CAPITATA (WIED.)

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ABSTRACT

The polytene chromosomes from male orbital bristle cells of two genetic sexing (GS) strains of the medfly were analysed to determine the position of their respective translocation breakpoints. Both GS strains are based on a pupal colour dimorphism.

The availability of polytene chromosomes could provide information about potential GS strain stability. Construction of a GS strain involves the isolation of an effectively dominant GS allele and the translocation of this allele to the Y-chromosome. The frequenzy of recombination between the translocation breakpoint and the GS allele, which leads to the breakdown of the GS system, is proportional to the distance between these two locations. Thus, selection of a translocation breakpoint as close as possible to the GS gene could provide a more stable sexing mechanism. Such selection is possible if the position of the GS gene and of the translocation breakpoint could be allocated to specific bands on the polytene chromosomes. The polytene chromosome structure of the the analysed GS strains and the implications for strain selection are discussed.

This work forms part of a Joint FAO/IAEA Division programme on the development of genetic sexing mechanism in the Mediterranean fruit fly, Ceratitis capitata (Wied.).

WORKING GROUP 9

ORGANOPHOSPHATE AND CARBAMATE RESISTANCE IN MOSQUITOES OF THE CULEX PIPIENS COMPLEX

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ABSTRACT

Organophosphate resistance in the Culex pipiens complex is sometimes associated with one or more detoxifying esterases inhibited by TPP or TBPT, sometimes with a mutant acetylcholinesterase. The latter gives cross resistance to carbamates. Resistance to carbamates in one particular strain from Tanzania, East Africa (DAR/D) is not, however, associated with a mutant acetylcholinesterase. The basis of resistance in this strain is not known.

The present work is aimed at analysing the inheritance of detoxifying esterases and their relationship with variation in acetylcholinesterase in determining resistance. Electrophoretic techniques (vertical PAGE) are being used to produce lines pure for particulars highly active electrophoretic bands. It has been shown that the DAR/D strain selected with the carbamate propoxur (and fairly resistant to it) does not show highly active bands. Other, recently colonised, strains from Tanzania show four active bands. Two different bands are present in a strain from Venezuela. Progress in isolating strains homozygous for the different bands and determining the pattern of cross resistance in these strains is reported.

WORKING GROUP 1

THE EFFECT OF IONIZING RADIATION ON SOME PHYSICAL PROPERTIES OF LACTALBUMIN

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ABSTRACT

The ultrafiltered lactalbumin concentrate as additive is widely used by the up-to-date food industrial technologies in order to increase the protein content of foodstuffs.

Our aim was to investigate the composition of concentrated lactalbumin powder without and with Fe^{++} by PIXE-method (particle induced X-ray emission) and the effect of gamma ionizing radiation on these products by ESR-, thermo- and chemoluminescence investigations, furthermore by electrical and dielectrical measurements.

We were interested in answering the following questions:
What is the effect of Fe^{++} additive on the physical properties? To what extent are the applied methods applicable for the detection of the degree of irradiation?

Beyond the possibilities of practical applications the obtained results give useful information to the interpretation of interaction between radiation and material in basic research.

WORKING GROUP 5

SELECTION IN WHEAT BY USING ^{15}N STABLE ISOTOPE

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ABSTRACT

Application of ^{15}N labelled fertilizers in agrochemical research is widespread in order to determine the nitrogen utilization coefficient depending on dosage, N-compound, time of dressing split or single application. Fertilizing with ^{15}N labelled N-compounds gives also possibility for comparing the different genotypes in the respect of N-response. The variety-specific N-fertilization of different winter wheat cultivars can be considered as a new trend and ought to be taken into account in fertilizing practice. Therefore it is important to study not only the N-response of wheat varieties, but to know the inheritance of this quantitative trait, as well. The first step is in that direction is the examination of the variance within varieties in the respect of N-response, that is N percentage, ^{15}N-enrichment, amount of nitrogen taken up by individual plants from the soil and the fertilizer respectively.

N-utilization of Mironocskaya 808, Sava, Baranjka and Mv4 varieties and their F_1, F_2 progenies was studied in a pot experiment with ^{15}N labelled NH_4NO_3. Both the N-content of the grain and the N-deposition into the kernels showed a wide variation width. In most cases there was found an intermediate inheritance in traits determining N-utilization. Stabilization of the plus or minus variants can only be achieved by controlling several generations.

WORKING GROUP 1

PROPERTIES OF IRRADIATED EGG-WHITE

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ABSTRACT

The egg-white is used in large scale in food industry, the microbiological quality of the products can improve by irradiation, reducing and eliminating the viable cell counts. The hygienic point of view is very important to reduce some groups of microorganisms. The effective dose for liquid egg-white irradiated in frozen state against original microflora and artificial contamination (enterococcus, etc.) is 3 kGy.

The techno-functional properties of the irradiated egg-white (liquid and powdered) improved. The foam stability increased as a function of dose and is related to aggregates production of egg-white. It was investigated by sos-page technique and the protein fractions were studied.

WORKING GROUP 4

HIGH RESULUTION X-RAY IMAGING IN PLANT- AND ANIMAL-SPECIMENS

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ABSTRACT

The resolution of x-ray systems is limited by the diameter of the focus. In "classical" x-ray systems the diameter of the focus is between 0.3 and 1 millimeter, for some special applications diameters of 0.1 mm are used. This limits the resolution of x-ray pictures to nearly the same size. Normally only details of aproximately 0.5 mm can be resolved. In biological objects important structures are often smaller and can therefore not be resolved.

If we have a x-ray source like a point with a few micrometer of diameter, the region of the unsharpness at the x-ray picture decreases likewise to nearly the same size. Thereby we get an optimal sharp picture and can do magnifications up to more than 100 times even during the exposure.

The microfocus system, we could use, has a focus of few micrometers (typ. 3 x 5 micrometer). This is attained by an extreme small electron beam, which is focused by different systems. The most important one is a magnetic lense like that in an electron microscope. Optimizing the current through the magnetic lens, the diameter of the focus can be adjusted electronically to a minimal value, and we get an optimal sharp picture.

Some pictures of different biological objects demonstrate the facilities of this new x-ray system: bones of fetal rabbits for studies of calcification, teeth for studies of paradontosis, insects, grains of seed for studies of their quality, leafs, trees. These pictures open a new understanding of the biological specimen.

WORKING GROUP 1

IDENTIFICATION OF IRRADIATED FRESH FRUITS

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ABSTRACT

During ripening and senescene the starch decomposed in the apple. We have separately studied the skin and flesh of apple. It was established that short time after irradiation (4 - 5 days) starch synthesis was induced in the skin and flesh of apple. (Gloster, Mutsu, Golden Delecious).

The starch was only preserved in the skin of the irradiated apple for at least 3 months (apple was stored at 1 - 2 °C, 80 - 90 % RH) (Kovacs et al., 1988).

In our present work on one hand the sugar (fructose, glucose, sucrose) were studied as a function of irradiation dose (0, 0.5, 1, 2 and 5 kGy) in apple (Golden Delicious) skin and flesh by HPLC technics, on the other hand the starch content was determined chemically and by an ultrastructural method. The investigations were carried out with 6 weeks old apples (stored at 16 °C, 80 90 % RH). 5 days after irradiation all samples were checked by starch iodine test. Starch synthesis was induced as a function of irradiation treatment in the flesh of apple. Six weeks later this test was repeated and it was established that the starch decomposed in all samples except 5 kGy. The analysis of sugar showed that the glucose concentration increased in the flesh with the increasing radiation doses. Starch could not be observed in the flesh of apples, neither chemically nor with ultrastructural investigations. In the skin the starch content increased as function of radiation treatment. 1 kGy dose caused a significant effect ($P \geq 99$ %) on the synthesis of starch. At the same time the glucose-fructose and sucrose contents increased up to 1 and 2 kGy, respectively afterwords they decreased (Kovacs et al., 1989).
Summaryzing our results:

1. Starch synthesis is significantly induced by irradiation (1 kGy) in the skin of apple.
2. This change is observed in short time after irradiation (4 - 5 days) and is preserved for a longer period.
3. This change is independent from the apple variety.

Data will be published in Food Microstructure (Kovács et al., 1988, 1989).

WORKING GROUP 3

HEMOGRAM IN THE RADIOACTIVE PHOSPHORUS (^{32}P) TREATED CHICKENS

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ABSTRACT

An attempt has been made to compare radiosensitivity of liver and hemopoietic organs in the chickens. We already have investigated an enzimatic profile in the blood plasma of ^{32}P treated chicken as indicator of liver damages; this time we investigated the hemogram as indicator for radiation injury in the same chickens. Fifty day old hybrid chickens of heavy Ross breeds of both sexes were treated by ^{32}P administred intramusculary as sodium bibasic orthophosphate in a single dose of 166,5 MBq per kilogram of body weight. Blood samples were taken from the wing vein 24 hours before the experiment and on the days 1, 3, 5, 7 and 10 after administration of ^{32}P. The erythrocytes (Er), leukocytes (Le), thrombocytes (Thr) and lymphocytes (Ly) counts, hematocrit (Ht) as well as hemoglobin concentration (Hb) were determined in the control and by radioactive ^{32}P treated birds. Er, Le and Thr counts were determined by using a hemocytometer. Ly counts were determined by examination of stained blood smear and expressed as absolute number. Hb was determined photometrically, and Ht was determined by microprocedure. Throughout the investigation there was a decrease tendency of all hematological parameters in the ^{32}P treated birds, but a statistically significant decrease was recorded not earlier than at the third day after ^{32}P administration, when Le and Ly counts decreased. After that statistically significant decreases were recorded as follows: On the 5^{th} day - Le and Ly counts; on the 7^{th} day - Er, Le, Thr and Ly counts, on the 10^{th} day - Er and Thr counts (Le and Ly counts have not been determined because of technical reasons), Ht and Hb. These data suggested that liver in the chickens is as much affected by ionizing radiation as is the bone-marrow, which is not true of the mammals.

WORKING GROUP 5

DYNAMICS OF ^{15}N-UREA ASSIMILATION IN MAIZE SEEDLINGS

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ABSTRACT

The present study is devoted to the dynamics of the uptake and the assimilation of urea in plants. Urea-^{15}N was applied to the maize seedlings cultivated in the water culture. Mathematical expressions for the growth rate and for the dry matter weight of maize seedlings confirmed that the manage part of the plant for cited parameters is the upper part of the plant.

Endogenous-^{15}N testified the direct uptake of urea by roots after the 24 hours application. Protein-^{15}N confirmed the immediate hydrolysis of urea within the plant and the first metalbolic conversion to amino acids and proteins.

The higher ^{15}N-enrichment in aspartate and asparagine in early vegetation phase was probably connected with the starting detoxication period of the metabolic process. ^{15}N-incorporation to glutamate-glutamine complex confirmed a quick progress of the urea hydrolysis and the transport of intermediates into the plant. Transformation processes could be considered as the completion of the direct amination of ketoacids (^{15}-enrichment in alanine and asparagine in the early phase after the ^{15}N-urea application).

WORKING GROUP 5

SOIL-PLANT RELATIONSHIPS IN WHEAT NUTRITION

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ABSTRACT

Chemical plant analyses of wheat (Triticum aestivum L.) and soil analyses of brown soil of the control field stands were used for observing the fertilizer availability and the soil nutrition. The time of the nitrogen fertilizer application and the influence of time and doses of the fertilizer on the increasing mobilization of the soil nutrients were registered. The plant uptake of mobilized macronutrients (N, P, K, Ca and Mg) from the soil system was refered to the utilization of wheat vegetation phase. The confirmation of the increasing uptake of soil nitrogen fractions from the soil solution by wheat seedlings was documented by the model experiments.

WORKING GROUP 11

ION TRANSPORT PROPERTIES OF LIPOSOME MEMBRANES INFLUENCED BY ALKYL SULPHONATE COMPLEXES WITH BIOLOGICALLY ACTIVE DODECYLOXY-METHYLENE-METHYLMORPHOLINIUM CHLORIDE

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ABSTRACT

It was shown in the earlier studies that dodecyloxymethylenemethyl-morpholinium chloride (DOMM) possess stron fungicidal properties. It seems to be interesting whether the change of chloride in this compound into another anion will influence the effectiveness of their action. A homologous series of alkylsulphonates (AS-n) was chosen. One may assume that fungicides attack the cell membrane at first. To study the molecular mechanism of action of the compounds on that type of ion transport process across model biological membrane, bimolecular phospholipid membrane has been taken. That means, sulphate ion transport across unilamellar lecithin liposomes was studied. The radioactive tracer method has been used. It was found out, that AS-n alone did not influence the ion transport, but their complexes with DOMM compound changed the rate constant when compared with that for DOMM. The complexes of DOMM with AS-14 and AS-16 affect the ion transport weaker than DOMM, but the complexes of DOMM and AS-*n* with alkyl chains shorter than that of DOMM increase the ion transport. A maximum was found for AS-6. It was discussed the significance of the molecular shape of the complexes as well as the dipolar character of their polar part.

WORKING GROUP 1

CANADIAN PERSPECTIVES ON FOOD IRRADIATION

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ABSTRACT

Canada has been in the forefront of irradiation technology for some 30 years. It is ironic that nearly 90 of the 140 irradiators used worldwide are Canadian-built, yet Canadian food processors have been very slow to use the technology. However, things are beginning to move now. This paper will provide an updata on the food irradiation regulatory situation in Canada, the factors that influence it, and review some significant non-regulatory developments.

WORKING GROUP 1

TRANSPORT AND DISPOSAL OF COBALT-60 INDUSTRIAL IRRADIATION SOURCES

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ABSTRACT

This paper will deal with safety aspects of the handling and transportation of Cobalt-60, the most widely used industrial radio-isotope. Cobalt-60 is a man-made radioisotope of Cobalt-59, a naturally occurring non radioactive element, that is made to order for radiation therapy and a wide range of industrial processing applications including sterilization of medical disposables, food irradiation, etc. The shipment of a Cobalt-60 source is the last step in a long and detailed manufacturing and quality control process which includes material specification and preparations, as well as design, manufacture and quality assurance procedures for the encapsulation, reactor targets and shipping containers.

The safe transport and disposal of Cobalt-60 industrial radiation sources is essential to the viability of gamma processing technology world-wide. Producers and users of sources are stringently regulated. Transportation packages are tested. Safe disposal options exist and are undergoing continual review. Primary producers such as AECL cooperate fully with regulatory agencies to improve evaluation technology to keep pace with changing requirements.

WORKING GROUP 1

EFFECT OF HEAT, IRRADIATION, PACKAGING AND THEIR COMBINATION ON THE KEEPING QUALITY OF TOMATOES ARTIFICIALLY INFECTED WITH BOTRYTIS CINEREA

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ABSTRACT

Tomatoes cannot be stored for long at ambient temperature because of overripening and rotting. Irradiation offers the possibility to delay ripening and extend the shelf-life bus cannot control mould growth completely within the dose range suitable for tomatoes.

Tomatoes artificially infected with Botrytis cinerea were dipped in hot water (47 °C for 5 min), packed (open trays and trays wrapped with polyvinylchloride foil) and irradiated (0, 0.5, 1.0 and 1.5 kGy). The combination of heat, packaging with polyvinylchloride foil and irradiation with 1.5 kGy was very effective in control of rot.

WORKING GROUP 1

FOOD IRRADIATION PROGRESS IN ISRAEL 1987/1988 AND PROGRAMME FOR 1989

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ABSTRACT

The main feature of the Food Irradiation Programme in the present year has been the considerable interest of the agricultural and food industry establishment, but particularly of private producers and marketers, in a series of screening studies with a great variety of products.

Most of these have been successful and negotiations are being completed for major semi commercial trials in 1989. One of the major incentives has been the number of clearances for food groups, that were issued at the beginning of 1987, as well as the wide publicity given to the technology in food industry and agricultural journals. This has resulted in the submission of a new petition to clear all food up to 10 kGy, which should be granted before the end of 1988. 60 tons of spices have been irradiated commercially for the food industry in 1987 and 100 more will be irradiated in 1988. Over 50 tons of garlic have been irradiated in 1988 for marketing at the begin of 1989. In addition tens of tons of additional products are planned to be irradiated and marketed in 1989. These will include fresh vegetables and fruits as well as some dry foods and poultry. An ICGFI sponsored course on "Assessment of economic feasibility of food irradiated and marketed in 1989. These will include fresh vegetables and fruits as well as some dry foods and poultry. An ICGFI sponsored course on "Assessment of economic feasibility of food irradation applications" has been held at the begin of the year and another on "Proper use of irradiation to reduce post harvest losses" will be held at the begin of 1989.

WORKING GROUP 1

LOW COST SMALL SCALE COMMERCIAL FOOD IRRADIATION FACILITY

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ABSTRACT

The introduction of commercial, industrial-scale food irradiation technologies must be preceded by consumer acceptance tests, market studies and development of process specifications using semi-industrial (pilot-scale) facilities. While these latter installations, now available, are somewhat less expensive than industrial plants, their absolute costs as well as their uneconomic operation deter private investors, unless large subsidies are provided by the national authorities. When such authorities are unable to provide the requisite support, the commercialization of food irradiation does not proceed, with consequent detrimental implications for the population at large and the national economy as a whole, and obviously, no commercial facilities will be purchased.

In order to resolve this impasse, SNRC has designed a novel semi-industrial versatile irradiator whose cost will be from 30% to 50% of that of small industrial plants now available but with equivalent or greater throughput and, hence, more economically attractive to private investors as well as more eligible for subsidized assistance, if required. The prototype facility is planned to be operational in 1989.

WORKING GROUP 2

RECURRANT SELECTION FOR USE OF MICRO MUTANTS IN BREEDING PROGRAMS

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ABSTRACT

A Modification of recurrent selection was used in developing cold resistant sudangrass lines. Selection was based on early sowing and germination at low soil temperature (8-10 °C).

The genetic variability was generated by gamma irradiation and EMS treatment of seeds as mutation breeding techniques had been proven to be useful for the developement of tolerance to environmental stresses.

Cold resistant plants were indentified before cross pollination. This meant that selection and crossing was done in the same year. This method proved to be effective in partical breeding program.

WORKING GROUP 11

RESPONSE OF PEROXIDASE AND AMYLASE ISOENZYME ACTIVITIES OF AESCULUS HIPPOCASTANUM AND PICEA ABIES TO GAMMA AND BETA IRRADIATION

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ABSTRACT

Gamma and beta irradiation (10 Gy, 30 Gy) of wood and leaves of Aesculus hippocastanum and of wood of Picea abies does not influence the activity of peroxidase isoenzymes (E.C.1.11.1.7.); amylase (E.C.3.2.1.) activity however is affected.

WORKING GROUP 9

THE FAO/IAEA PROGRAMME IN GENETIC CONTROL OF INSECTS

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ABSTRACT

The Insect & Pest Control Section of the Joint FAO/IAEA Division and its associated Entomology Laboratory Unit at Seibersdorf has been involved in developing genetic control of insects during the past two decades. Major emphasis has been placed on the sterile insect technique, which involves radiation-induced sterility, for use against the Mediterranean fruit fly, **Ceratitis capitata** and several species of tsetse fly, **Glossina** spp.

These studies have involved mass-rearing of the insects, radiation-sterilization, handling procedures, and field R & D projects as well as operational field eradication projects.

Fundamental studies have been conducted on medfly genetics with the objective of developing a genetic sexing strain. This research will be described in another presentation. Studies have also been conducted to develop an artificial diet for the tsetse fly. This work involved tsetse fly nutrition studies which included the use of radio-labelled chemicals. Recent studies have been undertaken to determine whether **Bacillus thuringiensis** can be used to kill adult medflies.

The above will be discussed in relation to the field application of the SIT, both on-going and planned projects.

WORKING GROUP 1

WORLDWIDE STATUS OF FOOD IRRADIATION AND THE FAO/IAEA/WHO/ITC-UNCTAD/GATT INTERNATIONAL CONFERENCE ON THE ACCEPTANCE; CONTROL OF AND TRADE IN IRRADIATED FOOD

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ABSTRACT

Practical application of food irradiation as a process for food preservation and decontamination has gained momentum after the conclusion of the Joint FAO/IAEA/WHO Expert Committee on the Wholesomeness of Irradiated Foods, convened in October 1980, which stated that irradiation of any food commodity up to an overall average dose of 10 kGy causes no toxicological hazard and introduces no special nutritional or microbiological problems. This conclusion was endorsed by the Codex Alimentarius Commission in July 1983 when this Inter-Governmental body adopted the Codex General Standard for Irradiated Foods and Recommended Code of Practice for the Operation of Radiation Facilities used for Treatment of Food.

Although 33 Governments have regulations allowing the use of irradiation for processing specific food commodities, the commercial application of this technology is still rather limited and international trade in irradiated food is virtually non-existent. This limitation may be attributed to technical, infrastructure, economics, harmonization of regulations and consumer concerns. Despite this limitation, irradiated foods have been introduced on a commercial scale in varying quantity based on regulations and market demand in 19 countries at present. Twelve other countries are either conducting or in advanced planning stage of irradiation facilities for commercial treatment of food or for demonstration.

Future trends on the advantageous uses of irradiation for processing foods including overcoming quarantine barriers, ensuring hygienic quality of food and ingredients, a broad spectrum process for reducing food losses and a method to satisfy increasing market demand for fresh foods will be discussed.

The role of IAEA and other International Organizations in evaluating the safety of irradiated foods and on the proper application of this technology to reduce food losses, improving public health aspects and facilitating wider distribution of food in trade will be described. The role of International Consultative Group on Food Irradiation (ICGFI), established in May 1984 under the aegis of FAO, IAEA and WHO and supported in cash or in kind by 26 member Governments will also be discussed. IAEA and other international Organizations will continue to play an important role in training, technology transfer, developing guidelines for specific applications, proper control of the process and providing factual and authoritative information on food irradiation.

The FAO, IAEA, WHO and ITC-UNCTAD/GATT will jointly convene an International Conference on the Acceptance, Control of and Trade in Irradiated Foods, in Geneva, Switzerland, 12. - 16. December 1988. The Conference aims to achieve an internationally-agreed document on the acceptance and control of international trade in irradiated foods.

WORKING GROUP 7

DEPTH DISTRIBUTION OF RADIOCAESIUM IN AGRICULTURAL SOILS IN CHERNOBYL FALLOUT AREAS OF SWEDEN IN 1987-1988

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ABSTRACT

The depth distribution of radiocaesium (134-Cs and 137-Cs) in the top soil profile of various types of agricultural soils with respect to vegetation type (permanent pastures, leys and soils ploughed once after the deposition) and soil type (clay, sandy and peat soils) has been investigated in Chernobyl fallout areas of central and middle Sweden in the autumn of 1987 or in the spring of 1988, i.e. 18 or 24 months after the deposition. Techniques of sampling and analysis are described, and results are presented and discussed.

The results showed that on permanent pastures and on leys established before 1986 between ca. 70 and 90 per cent of the total deposition of (134+137)-Cs was found at the depth intervals of 0-10 or 0-20 mm. Below 50 mm only minute activities of the nuclides were recovered. On leys sown in 1986, i.e. a few weeks after the deposition, the (134+137)-Cs activity decreased regularly down to ca. 100 mm depth. On soils ploughed in 1986 an irregular distribution of the Cs-nuclides was found within the ploughing depth applied.

WORKING GROUP 9

THE SUSCEPTIBILITY OF COLORADO POTATO BEETLE (LEPTINOTARSA DECEMLINEATA SAY) TO SOME INSECTICIDES IN POLAND

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ABSTRACT

Systematic studies on the susceptibility of pests to the used insecticides allow to notice early resistance and to organize the necessary action in order to delay its development. The paper presents the results of studies conducted in the period of about 20 years on the changes in the susceptibility of the summer beetles of the Colorado potato beetle (Leptinotarsa decemlineata Say) to the following insecticides: DDT, lindane, methoxychlor, propoxur, carbaryl, chlorfenvinphos, and bromfenvinfos. The photostable pyrethroids such as deltamethrin, cypermethrin and fenvalerate were also included in the last 6 years.

It has been stated that the summer beetles were highly resistant to DDT, although the compound was not used for the last 15 years, and to lindane. From 1976, the increase of resistance (tolerance) to carbaryl and methoxychlor was observed. The level of susceptibility to propoxur was not changed but some changes in the susceptibility to chlorfenvinphos was found. The susceptibility of summer beetles to original Polish compound, bromfenvinfos, and to photostable pyrethroids was not significantly changed.

WORKING GROUP 9

INHERITANCE OF RESISTANCE TO PHOTOSTABLE PYRETHROIDS IN THE HOUSEFLY, MUSCA DOMESTICA L.

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ABSTRACT

Three resistant strains of housefly were obtained by selection of the laboratory strain with deltamethrin, or cypermethrin, or fenvalerate for twenty generations. The type of resistance induced by selection with the above mentioned pyrethroids involved all pyrethroids tested, pyrethrins, DDT and methoxychlor. Studies with synergists gave poor effect and suggest that non-metabolic mechanism such as reduced sensitivity of the target site (kdr) may be the main mechanism of resistance.

The studies on the inheritance of this resistance were undertaken. The back crossing of the resistant strains with the parental strain and the examination of F_1 susceptibility to the respective selecting pyrethroid showed that the inheritance of this resistance is recessive. The studies strongly support the hypothesis that the main mechanism of resistance is connected with kdr gene.

WORKING GROUP 7

LEVELS OF ^{137}Cs IN SWEDEN 1986-88

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ABSTRACT

The levels of radiocesium registered in environmental samples collected in different parts of Sweden following the Chernobyl accident are reported. The results concern measurements performed during the period 1986-88. Parameters possibly affecting the nuclide concentration in different biota are briefly discussed.

WORKING GROUP 2

INFLUENCE OF LIGHT-TREATMENT ON THE ENZYME-ACTIVITIES OF SOME VEGETABLES AND FRUITS DURING THE STORAGE-TIME

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ABSTRACT

The aim of the investigations was to study the effect of special light-technique treatment on the enzyme activities (PME and MDH) and preservation of cucumber and cauliflower during the storage-time. The treatments were done by light-technological methods: STIMOKOMPLUX and SYNERGOLUX, the doses were 20 and 180 sec. The temperature of storage was between 0 and +5 °C during 4 weeks. The influence of light-irradiation was better in the case of cauliflower than that of cucumber, and the SYNERGOLUX 20 treatment was the most effective one.

The subject of our present research is apple, using SYNERGOLUX technology, with doses 10, 20 and 60 sec. The samples are stored in cold-storer temperature: 5 °C and under household conditions. The period of storage is 6 months.

WORKING GROUP 5

DISTRIBUTION OF FISSION RADIONUCLIDES IN CULTIVATED SOILS OF STYRIA AFTER CHERNOBYL

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ABSTRACT

By the event of Chernobyl the fallout was deposited in very different intensity mainly depending on the rainfall at that time.

We have investigated the distribution of the radionuclides in various soils and locations in Styria since 1986. Moreover a special method of taking soil samples was developed to find an average of the natural deviation of the local activity distribution. The collection of probes was done till 50 cm of depth in layers of 1 to 5 cm. The measurement of the specific activity particularly of Cs-137 and Cs-134 was carried out by computer controlled spectroscopy system with a semiconductor detector. For the evaluation of the results the coincidence summing correction and the corrections for the geometry (Marinelli beaker) and density effect were taken in consideration.

As to be expected, the distribution of radioisotopes as a function of the distance from the surface proved to be exponential decreasing superimposed with the distribution of the residual Cs-137 due to the fallout of former years with its maximum in the deeper layers. The migration is extremely controlled by physical and chemical soil parameters like water permeability and ratio of free cations of potassium and cesium.

WORKING GROUP 3

CONTENTS OF RADIOCESIUM 137 AND RADIOSTRONTIUM 90 IN BROILER NUTRIENTS RICH IN SOY

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ABSTRACT

The contents of radiocesium and radiostrontium in Broiler nutrients containing soy to 20 - 25 %, were investigated during 1985 and during a period of time after Chernobyl accident (1986-1987). The research was extended to investigation of contents of radiopotassium 40 and radium 226 in the same kind of nutrients. In that way, we obtained the data about the increasing of the irradiation risk for fast fattening poultry if the soy rich nutrients are used.

WORKING GROUP 4

PESTICIDE ASSAY BY MEANS OF PHOTOBACTERIUM PHOSPHOREUM LUMINISCENCE MEASUREMENT

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ABSTRACT

Conditions for use of photobacterium phosphoreum suspension as an analytical agent in a nonspecific pesticide assay were studied. A suitable way of cultivation for getting a culture with high light output was found. Side effects influencing the luminiscence (temperature, time, ionic streth and pH) were estimated. An assay was worked out, that can both meet the physiological demands of Photobacterium phosphoreum and prevent false results due to side effects. The light output was measured in mV on a modified spectrophotometer with a sensitive photomultiplier. The sensitivity of the assay was tested on 18 water soluble or miscible toxic substancies including 14 common pesticides. The concentrations quenching 50 % of luminiscence ranged from 0.2 mg/l for metham to 550 mg/l for asulam. Our results were compared with rat toxicity assay and the Photobacterium phosphoreum assay was found to be in most cases ten to hundert times more sensitive.

WORKING GROUP 3

CONCENTRATION OF T-4, T-3 AND INSULIN IN THE SERUM OF LAYING HENS DURING EGGS PRODUCTION PERIOD

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ABSTRACT

Investigations were carried out of changes in thyroxine (T-4), triiodothyronine (T-3) and insulin concentration in the blood serum of the laying hens during laying period. The hens were kept in cages and fed standard food for laying hens. Concentration of T-4, T-3 and insulin were determined by the radioimmunological methods once a month during laying period. The results will be presented in the relation to the eggs production. All of these investigated biochemical parameters have shown changes during period of the eggs production.

WORKING GROUP 11

NITRATE ASSIMILATION, SEEDLING STAGE PARENTAL-PAIR COMPLEMTARITY AND HETEROSIS IN ZEA MAYS L.

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ABSTRACT

The possible use of physiological/biochemical traits in breeding programmes have been expected to assist in future selection for increased grain yield in maize, if key traits could be identified.

The aim of the study was to possibly establish a parental inbreds complementary relationship with regard to nitrate assimilation rate and assimilatory number. Combined measurement of these two parameters being connected with the seedling stage "sourcesink" potentials was performed under controlled conditions. The general work-design questions were considered earlier (Mladenova, 1985).

Six maize lines and four high yielding single-crosses recently released for commercial use were investigated. Assimilatory number = mg $^{14}CO_2.dm^{-2}.h^{-1}$/mg chlorophyll(a+b).g^{-1}Fr. leaf wt.; $^{15}NO_3$-ions assimilation rate = ug total red. $^{15}N.Plant^{-1}$/mg Dry wt.roots.$plant^{-1}$. The latter trait was considered also as a contribution root efficiency to $^{15}NO_3$- assimilation.

The parent pair lines of all hybrids investigated exhibited contrasting but complementary characteristics: The female parent showed simultaneously higher rate of photosynthesis per chlorophyll unit and lower rate of $^{15}NO_3$-assimilation compared to the male parent. The opposite is true fot the latter. The data are in accordance with previous conclusions of ours (Mladenova, 1985). These data reflect in fact selection results obtained in the course of the breeding practice spontaneosly, i.e. unplanned, regarding metalbolic characteristics. Conventional breeding has spontaneously followed the course of choosing complementary parents.

Mladenova Y.I. 1985 Early biochemical evaluation of Zea mays L. genotypes for corn breeding purposes, In "Intensification and quality improvement of corn breeding and technology" Eds N.Tomov et al., pp 203-218 (in Bulg.), Sofia

WORKING GROUP 9

GENE AMPLIFICATION IN INSECTICIDE-RESISTANT MOSQUITOES AND DEVELOPMENT OF GENETIC ENGINEERING TECHNIQUES IN INSECTS

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ABSTRACT

Recent works have shown that gene amplification is a widespread mechanisms for acquisition of pesticide resistance in insects. We have now characterized the DNA structure responsible for overproduction of esterase B1 in an organophosphate (O.P.)-resistant **Culex quinquefasciatus** strain (MOUCHES **et al.**, 1986, Science, 233, 778-780).

The amplification unit (amplicon) is larger than 30 Kb. It contains a constant, highly conserved, 22 Kb "core". Each core carries a single copy of the 3 Kb esterase gene. Some sequences of the core are present at a low, or even single, copy number in the genome of mosquitoes not overproducing esterase B1; this is the case of the esterase gene itself and of a 12 Kb sequence on the left arm of the core. Such sequences are thus amplified only in O.P.-resistant mosquitoes, as a consequence of the selection pressure.

The core of the amplicon contains in addition two elements displaying strong homologies with middle or highly repetitive sequences which are squattered throughout the genome of both susceptible and O.P.-resistant mosquitoes. The "**Culex** element 1" (CE 1) lies in the amplicon upstream the 5'-end of the esterase gene. Most of CE 1 related sequences are dispersed into the genome of various C. **quinquefasciatus** and C. **pipiens** strains, but some of them are on extrachromosomal molecules. The 5.2 Kb CE 2 element, lying at the 3'-end of the esterase gene, is built up of two different repetitive sequences. The two ends are the constitutive moeities of a 2 Kb highly repetitive DNA sequence, the "JUAN" element, which represents about 3 % of the total mosquitoe's DNA. The central part of the CE 2 element is an insert of 3.8 Kb which also contains sequences repeated through the genome of mosquitoes, albeit at a lower frequency that "JUAN" elements. "JUAN" elements are squattered throughout the genome of mosquitoes, but some of these elements are also carried out on extrachromosomal DNA, as it is the case for some molecules from the amplicon containing the esterase B1 gene.

Several features strongly suggest that the CE 2 element and the "JUAN" sequence it contains may play a role in the amplification process, perhaps as an origin of replication. Moreover, "JUAN"-like elements have been detected in various insect species, each time associated with amplified DNA. Thus, we are looking further to use CM 2 and "JUAN" elements as vectors for developping gene transforamtion systems in insects.

WORKING GROUP 11

ERROR IN ^{86}Rb UPTAKE BY BARLEY (HORDEUM VULGARE) INDUCED THROUGH TITRATION OF UPTAKE MEDIUM WITH NaOH

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ABSTRACT

The pH of a rooting medium affects the uptake of many nutrients by plant roots. When the addition of a chemical to the uptake medium lowers the pH, the pH is often adjusted to the desired level through titration of the medium with KOH or NaOH. In cases where uptake of Rb (as an analogue for K) is to be investigated, however, the presence of Na may reduce the uptake of K, presumably due to the competition of these elements for the same uptake sites. It is commonly assumed that the amount of Na introduced into the solution through titration with NaOH is insignificantly low so as not to change the final experimental results.

In our investigations on the effect of some growth substances on the uptake of Rb by barley seedlings, we encountered drastic lowering of pH in the uptake solutions. By adding NaOH or RbOH, the pH was adjusted to 6.5, and finally by means of RbCl the total Rb concentration in the uptake media was brought to 0.1 or 11 mM. The activity of ^{86}Rb was 0.9 MBq/L and 3.7-4.5 MBq/L in the 0.1 mM and 11 mM Rb, respectively. The uptake solution was 0.5 mM in $CaCl_2$.

At 0.1 mM Rb concentration, when the solution was titrated with NaOH, the growth substance did not appear to affect Rb uptake. However, when RbOH was used for titration, the growth substance significantly increased Rb uptake.

At 11 mM Rb concentration, when NaOH was used, the growth substance appeared to inhibit Rb uptake by barley seedlings. However, when RbOH was used in adjusting the pH, there was no effect on Rb uptake. At this Rb concentration and in the absence of any growth substance, addition to the uptake media of Na (as NaCl), equivalent to that used in the titration media, resulted in similar inhibition of Rb uptake by the seedlings.

In our investigations, the lowest Na concentration resulting in considerabel inhibition of Rb uptake from a 11 mM RbCl solution was 1-2 mM. These observations indicate that the amount of Na added to the nutrient uptake media through titration with NaOH could become high enough to introduce an error into the experimental results.

WORKING GROUP 7

CONTAMINATION OF FOOD IN THE FIRST AND SECOND YEAR AFTER THE CHERNOBYL ACCIDENT AND ITS DERIVED DOSE TO THE AUSTRIAN POPULATION

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ABSTRACT

The variation with time of the activity concentration in various food items in Austria after the Cernobyl accident is given. In particular, first and second year activity concentrations of ^{137}Cs are compared. With an average level in the first year of 45 Bq/kg in milk, 73 Bq/kg in meat and 15 Bq/kg in cereals the activity concentrations in the second year decreased in milk and mealt to 20 %, in cereals to 4 % and in fruit to 18 % of the first year levels. Compared to the concentrations just after the accident a decrease to levels of less than 9 % was observed in these food items.

Measurement of the ^{90}Sr-activity concentrations showed no increase comparable to that of ^{137}Cs. On the contrary, it is shown that the intake of ^{90}Sr and the resulting dose are dominated by radiostrontium from the atomic weapons testing even after the Chernobyl accident.

From this activity concentrations and the average food consumption the ingested activity of ^{131}I, ^{134}Cs, ^{137}Cs and ^{90}Sr is estimated. The dose resulting from the intake of these radionuclides amounts to:

1. year: ^{131}I: 0,029 mSv, ^{134}Cs + ^{137}Cs: 0,421 mSv, ^{90}Sr: 0,006 mSv
2. year: ^{134}Cs + ^{137}Cs: 0,090 mSv, ^{90}Sr: 0,004 mSv

WORKING GROUP 3

BODY COMPOSITION AND EXERCISE IN RACING PIGEONS

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ABSTRACT

The use of body protein as an energy source during exercise is still a matter of some controversy although there is some evidence that this may occur in man and in horses competing in edurance events. The situation in racing pigeons is worth exploring because of the extent to which their fuel supplies can be depleted during long flights.

Our earlier work with ^{75}Se-selenomethionine indicated an increased turnover of body protein in racing as opposed to resting birds. To complete the picture it is necessary to measure exercise-related changes in the absolute amounts of body protein. The present study was aimed at doing this indirectly through following changes in lean body mass (LBM). Chemical analysis of a number of mammalian species has demonstrated a constant relationship between LBM and total body water (TBW). We have demonstrated that this relationship also holds in pigeons. Using tritiated water we have followed changes in LBM in a group of birds taking part in a very strenuous race (more than 15 hr on the wing). Although this resulted in a substantial loss of body solids the LBM remained almost unaffected. As a safeguard against an abnormal fluid/electrolyte status arising from the exercise, measurements of exchangeable body sodium and plasma osmolarity were also carried out.

The result suggests that the earlier Selenomethionine findings may represent the rapid turnover of a small labile pool of muscle protein. There is evidence for such a labile store in some bird species which can be drawn on for egg production.

The results will be discussed in relation to a rational aproach to racing pigeon nutrition.

WORKING GROUP 6

MUTANTS INDUCED IN WINTER RYE BY FAST NEUTRONS

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ABSTRACT

Dormand seeds of the cv. Chodan and of the strain WOB-25 were treated with fast neutrons at doses of 400, 500 and 600 rads. The treatment was performed at the Institute of Nuclear Physics in Cracow. After the treatment, the seeds were shown in the field. The M_1, M_2 and M_3 generations were observed. The dose of 600 rads was to high giving no survival in the field conditions. The doses of 400 and 500 rads induced considerable genetic variability and thus may be considered as the optimum for winter rye.

WORKING GROUP 4

IRRADIATION FACILITIES FOR NEUTRON ACTIVATION ANALYSIS IN DUBNA

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ABSTRACT

An on-beam spectroscope for promt radiations and a pneumatic sample transfer system called BIOPHYSICAL CHANNEL and REGATA in the reactor IBR-2 are briefly described. Selected references of boron determinations carried out in Dubna from 1970 are enclosed.

WORKING GROUP 5

DISTRIBUTION AMONG THE ORGANS AND EFFECTIVENESS OF USE OF SPLIT APPLIED FERTILIZER NITROGEN BY PEACH TREES

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ABSTRACT

A field experiment was performed using tracer nitrogen with peach trees grown on psammosoil in order to study the efficiency of use and the distribution of fertilizer nitrogen among the various organs. The above objectives were related to the time and rate of fertilizer application (50 kg of N/ha applied in March and 100 kg of N/ha applied in May) and to the presence of a cover crop (rye) used to prevent wind erosion during the winter and as green manure.

The experimental results showed that a peach plantation of 1250 trees/ha (cv. Jerseyland, 8 years old) accumulated 280 kg of N/ha, of which 114 kg of N/ha was found in the perennial organs. The highest amount of fertilizer-derived nitrogen was found in the leaves (43%), followed by the fruit (33%) and the roots (15%). The percent recovery of applied nitrogen was 15.0% and 66.6% for the first and second applications respectively. The average percent recovery of both rates of fertilizer nitrogen was 43.5%, showing that a tree uses the applied nitrogen better than a cereal on psammosoils, due to its deeper root system. The cover-crop used an important fraction of the nitrogen applied in March.

WORKING GROUP 11

MICROPROPAGATION OF PYRUS BETULIFOLIA

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ABSTRACT

In vitro techniques were applied to develop a micropropagation system for the strong growing pear rootstock Pyrus betulifolia. Meristem tips and shoot tips were isolated and multiplication of shoots as well as forming of roots stimulated on MS medium with the phytohormones benzylaminopurine (BA), 1-naphthaleneacetic acid (NAA) and gibberellic acid (GA_3). The three clones investigated reacted quite differently. Clone 3 developed best on MS medium with 4 mg/l BA + 0.1 mg/l NAA + 0.1 mg/l GA_3, the other two clones (5 and 9) performed best with 2 mg/l BA + 0.1 mg/l NAA + 0.1 mg/l GA_3. With all clones the rate of shoot multiplication could be raised by repeated subculturing in vitro. The best method for rooting was to dip the microshoots into a solution of indolebutyric acid (IBA) before planting in perlite soaked with quarter strength MS salt solution. Clone 3 rooted from 80 to 90 % with IBA concentrations from 10 to 500 mg/l, while clones 5 and 9 rooted well with 200 mg/l only. There were just minor losses during acclimatisation (transfer into stabilised peat - perlite mix in pots in the greenhouse) without respect to the IBA concentration applied for rooting.

WORKING GROUP 9

AROMATIC BALMS AND EMBROCATION AS POSSIBLE MOSQUITO REPELLENTS

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ABSTRACT

In southern Moravia, Czechoslovakia three aromatic balms and one essential embrocation were preliminary tested in summer in the wood as possible skin repellents against mosquitoes Aedes vexans and Aedes sticticus. Aromatic balm Cao Ba Binh is produced in Vietnam and consist of mentha oil, cinnamon oil and eucalyptus oil. Aromatic balm Cat Brand is produced in Vietnam and consists of connamon essence, eucalyptus essence, ocimum essence, mint essence, and other excipients. Aromatic balm Sea Gull Menthojelly consists of menthol 12 %, pepermint oil 12 %, eucalyptus oil 4,5 %, camphor 9 %, terpineol 2 % and other. Essential embrocation Polar Bear Brand produced in people's Republic of China is a liquid scientificaly prepared from superior perfumery materials such as Polar Bear Brand Menthol Crystals, pepermint oil and natural camphor, together with various kinds of other drugs. Main ingerdients: Polar Bear Brand Crystals 23 %, pepermint oil 20 %, natural camphor 15 %, eucalyptus oil etc. 42 %. It has a better effect on the prevention and treatment for mosquito bites. As this preparation has an effect in transquillization and shacking off cold, and especially can produce an instant result in refreshing insolation, itches and pains, etc. in the summer time, it is suitable both for internal and external administration. Being simple in application, convenient in carrying, it is an indispensable sovereign remedy both for home and travelling. It is used also for mosquito bites in the affected parts. For the preliminary field repellent tests were used 0,1 ml of essential oil or 0,1 g of aromatic balm for the treatment of the skin of hand to the knuckle. The left hand was treated with one of this mixture of essential oil and the right hand was not treated as control. The number of bites of mosquitoes were counted after 5 and 30 minutes. During the experiments the air temperature was 18 - 24° and air humidity 70 - 80 %. It was found, that only the essential embrocation Polar Bear Brand was effective more than 30 minutes.

WORKING GROUP 6

IN VITRO MUTATION BREEDING TECHNIQUES FOR APOMICTIC CROPS

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ABSTRACT

Development of **in vitro** mutation breeding technology is particularly important for apomictic crops where there is no sexual reproduction that could generate genetic variation. Garlic (**Allium sativum** L.), banana and plantain (**Musa** spp.) are examples for important apomictic crops. Different tissue culture techniques have been used in garlic for virus elimination and micropropagation. Mutagenesis were applied in shoot-tip culture of **Allium.** Polyploids and phenotypical variants were established among **in vitro** regenerated plants. Garlic is one of the species of the genus **Allium** with high regeneration ability in callus cultures. **In vitro** morphogenesis has been studied in callus cultures derived from leaf segments with the aim to induce somatic embryos and plant regeneration. Many chromosomal and phenotypical variations were observed among regenerated plants. Somaclones with different agronomical characters have been implemented in garlic improvement programme.

Breeding of bananas and plantains by sexual crossing is extremely difficult because only few semi-wild diploid clones produce viable pollen which can be used for crossing with female-fertile triploids resulting in production of few tetraploid seeds. Such breeding programme, however, did not achieve any new, satisfactory dessert banana cultivar and efforts on plantain have been minimal. **In vitro** mutagenesis offer a novel breeding strategy that may lead to new desirable varieties. Mutagenic gamma irradiation and chemical mutagen ethylmethansulphonate (EMS) have been applied in shoot-tip cultures. Various **Musa** genotypes have exhibited significant differences in radiosensitivity and post-irradiation recovery. These differences are dependent on the ploidy level and the combination of A (**acuminata**) and B (**balbisiana**) genoms. **In vitro** mutagenic treatment is followed by stimulation of adventitious bud formation. Anatomical studies in meristem culture of banana are presented and possibilities to avoid or dissolve chimerism are discussed. The variant phenotypes have been established in greenhouse in M_1V_4 generations. One plant has been selected for vigorous growth and earliness of flowering after irradiation of shoot meristems of the Cavendish banana clone "Grand Nain" with 60 Gy of gamma rays. This plant is now propagated **in vitro** for testing its clonal progeny in several locations of banana growing areas. Recently, the induction of somatic embryos and **in vitro** plant regeneration from embryogenic suspension have been achieved in **Musa.** This system offers a potential for mutation induction and selection. The single cell origin of the proembryonal complexes and somatic embryos in suspension culture should avoid chimera formation after mutagenic induction. Regeneration of banana plants in morphogenetic competent suspension culture may allow to use the enhanced genetic variation which is referred as somaclonal variation. The use of induced mutations has already considerably contributed to improvement of vegetatively propagated crops and **in vitro** techniques have an enormous potential to broaden the scope of mutation breeding technology.

OPENING SESSION

TRANSFORMATION OF ORGANIC MANURES IN SOIL AS TRACED BY RADIOCARBON

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ABSTRACT

The abandonment of animal husbandry in cereal growing areas of Central Europe has created problems of maintaining adequate levels of organic matter in the soil. The consequences of substituting the traditional farmyard manure by other organic manures can be investigated in field experiments of the conventional type, but the results obtained have only little statistical significance. The introduction of organic manures labelled with radiocarbon (^{14}C) has made it possible to overcome the shortcomings of the conventional method.

In this paper the preparation of uniformly ^{14}C-labelled organic manures of vegetal and animal origin is described. Results obtained from long-term experiments on the decomposition and humification of these materials in cropped and uncropped soil under field conditions are reviewed with particular emphasis on the work done in the author's institute during the past 25 years.

In order to predict optimal measures for maintaining adequate humus levels a mathematical model is presented, in this paper, for the calculation of equilibria between the decomposition of organic materials and the accumulation of their residues in the soil. This model tries to reconcile the discrepancies between our experimental evidence of the fast decompositon of organic materials added to the soil and our knowledge about the high stability of the aged humus.

WORKING GROUP 1

DESIGN, CONSTRUCTION AND INSTALLATION OF A STERILIZATION DOSE MEASURING DEVICE

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ABSTRACT

The paper gives information on design, construction and calibration of a measuring device for the determination of the sterilization dose rate and dose. The prototype device has been installed in a sterilization stand. The paper shows how to implement the stand and how to measure the traverses of the dose rate. The instruction how to put the apparatus in operation, as well as the operation manual may be obtained, if desired.

Application possibilities:

When appropriate conversion coefficients are used, the activity of large gamma radiation sources can be estimated.

WORKING GROUP 3

THE INFLUENCE OF A DIET ENRICHED WITH ALFA-KETOISOCAPROATE ON THE LAMB PERFORMANCE AND PLASMA INSULIN AND CORTISOL

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ABSTRACT

Intravenous and intraperitoneal administration of the ketoacid of leucine, α-ketoisocaproate (KIC), has been reported to affect lamb growth. To examine the effect of oral administration of KIC, 8 lambs (4 pairs of twins) weighing 21 kg were divided into two groups consisting of 1 animal from each pair. After a one-week adjustment period, half of the rams received a supplement of Ca-KIC (Proctected from rumen degradation) at 0.25 % of the diet dry matter for five weeks.

Blood was sampled from all animals in the fasting state after first, second, third, fourth and fifth week of the study. In addition to that, after third and fifth week, blood was also collected after the feeding. Plasma insulin and total cortisol were determined by radioimmunoassay using 125I-insulin and (1, 2, 6, 7 - 3 H) cortisol, respectively.

KIC treatment improved average daily gain (14 %; $P < 0.05$) and feed efficiency (6 %). In the fasting state, plasma insulin and cortisol were similar in both groups. In the fed state, rise in insulin level was higher in animals receiving KIC diet ($P < 0.01$). Plasma cortisol was lower in animals receiving KIC diet, both in fasting and fed state.

In conclusion, administration of KIC into the diet has stimulatory effect on lamb performance and insulin concentration after feeding.

WORKING GROUP 8

THERMOELECTRIC PLANTS WASTE HEAT UTILIZATION FOR PROTECTED ORNAMENTAL CULTIVATIONS

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ABSTRACT

The use of thermoelectric power plants waste water heat can be viewed as an energy saving application in the heating of those systems needing low temperature, as greenhouses (G) for example.

The supply of low enthalpy water becomes costless for the users as far as its thermal content is concerned but not with regard to the distribution. The pumping costs have to be considered seriously as there are considerable delivery capacities involved because of the low energy content (in Italy during winter, the temperature of the cooling water of a closed cycle wet tower thermoelectric power plant reaches values averaged between 20 and 23 ^{o}C).

Furthermore, taking always into consideration the low thermal level of these waters, there is a considerable increase of the exchange surface necessary to maintain a prefixed thermal level in the G's.

In order to reduce the exchange surface and the relating costs of investment the greenhouse should be adequately insulated, providing that degree of insulation obtained and relating investment make a ratio higher than the unit, at least within the depreciation time of the installation.

The experiment which is being carried on at Conphoebus test field in Catania makes a comparison between the performance of a double layer air inflated polyethylene G-tunnel fed by low temperature water (whose level simulates that one of the mentioned thermoelectric power plant) and that of two test greenhouses, same type of the first, one of which is provided with back-up heating and the other with traditional heating.

Ornamental plants have been cultivated in the three G's and have been used as agronomic validation of the same.

The first results, either technical (energy consumption, air and ground thermal level in the three G's) or agronomic (product quality and productivity) have indicated the advantages of the use of low temperature water for the conditioning of G's during winter in a Mediterranean climate.

WORKING GROUP 7

ON THE TRANSFER OF RADIOSILVER FROM PLANT TO ANIMAL

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ABSTRACT

After the Chernobyl nuclear reactor accident (April 26, 1986) radiosilver in form of 110m-Ag was found in the liver of cattle and sheep grazing on the pasture of the Mariensee Experiment Station 37 km northwest of Hannover, West Germany. In other edible parts of these ruminants like in muscles no 110m-Ag could be measured.

The radiosilver radioactivity in the liver of the ruminants was comparable to the order of magnitude of the radiocesium contamination of this organ. To quantify the transit from the environmental radiosilver pollution of the plant to the animal, Chernobyl contaminated hay was used in feeding trials to determine the radiosilver transfer factor from hay to liver in case of sheep.

A report on this study will be presented.

WORKING GROUP 7

APPLICATION OF STABLE ISOTOPE RATIO ANALYSIS TO FOOD SURVEILLANCE AND ENVIRONMENTAL RESEARCH

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ABSTRACT

Minor variations in the stable isotope composition of the bioelements are due to isotope fractionations during physical, chemical and/or biological processes of the considered substance in nature.

An important example is the difference in the Carbon-13 content between the C_4-plants (Hatch-Slack cycle) like maize and sugar cane, and the C_3-plants (Calvin-Bassham cycle). Therefore adultertions can be detected in certain cases.

Moreover microvariations in the carbon isotope ratio exists within the same plant group reflecting the influence of environmental parameters.

As different pollution sources and technical processes may slightly differ in the isotopic composition of their emanations this fact can be used as intrinsic tracer of the distinct source.

The analytical technique, essentially the on-line coupling of an elemental analyzer with an isotope mass spectrometer is described and results of carbon, nitrogen and sulfur measurements are given.

WORKING GROUP 4

SECONDARY STANDARDS IN ENVIRONMENTAL RADIOACTIVITY MONITORING

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ABSTRACT

Environmental radioactivity monitoring by gamma spectrometry brings along a number of very specific problems connected with measuring geometry and radionuclides carriers - state of aggregation and sample specific density, uniformity of radionuclide particles carriers distribution ecc. It is therefore necessary to establish for each category of environmental samples "secondary standards", which are to be alike as much as possible to the sample itself, its physical and chemical characteristics, radionuclides energy spectrum and radioactivity level.

Therefore, a monitoring gamma spectrometer (Ge(Li) detector + 4096 channel analyzer) was calibrated for different measuring geometries and radionuclides carriers. There were two measuring geometries the efficiency was determined for: a nonstandard Marinelle bottle (0.6 l) for fluid and solid state samples and a cylindric PVC box (200 g) for solid state samples. Standardization of different radionuclide carriers was performed by measuring the activity level of a standard radioactivity source in different carriers: soil, grass, water, milk and meat. The carriers were choosen due to the importance they take in the transfer chain from a source of radioactivity to man.

The experimental data enabled us to set the efficiency curves for different measuring geometries and radionuclides carriers in analytical form.

WORKING GROUP 5

A NUMERICAL ANALYSIS OF SOIL WATER BALANCE AND DRY MATTER PRODUCTION OF OATS

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ABSTRACT

A numerical analysis of soil water balance and dry matter production of oats was carried out on simulated and field results. The field experiments were conducted during the years of 1976, 1977, 1982 and 1983, on grey brown podzolic soils (Parabraunerde) near Göttingen (FRG).

The model used in this study is the Soil Water Balance and Crop Production Model (SWACRO). By making use of this model, different methods to compute the potential evapotranspiration and the actual transpiration (sink term) have been tested for their impact on the computed values of actual evapotranspiration rate, water uptake rate, soil moisture profiles, and dry matter production rate. The comparison indicated that the tested methods differed considerably in predicting those values.

In conclusion, the study revealed that the soil water balance and dry matter production of oats can be simulated fairly well if the method to compute the potential evapotranspiration, and the soil and canopy parameters are chosen carefully.

WORKING GROUP 3

USE OF HORMONE RADIOIMMUNOASSAYS IN DEVELOPING COUNTRIES

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ABSTRACT

The animal industry in developing countries is on the verge of capitalising from new biotechnological approaches to the reproductive management of livestock. The full benefit of these advances, measured in terms of an increase in livestock unit births (and their subsequent rearing to breeding age) per unit hectare of land, will only be achieved if developing countries use appropriate biotechnological techniques and employ them in the correct sequence, viz. nutritional and management improvements prior to, or at the same time as, breed improvement; the establishment of viable artificial insemination services prior to the introduction of embryo transfer; the training of veterinarians, extension workers and farmers in conventional oestrus detection procedures and record keeping prior to the introduction of a progesterone determination service. Where such trained assistance is present and communication allows rapid transfer of information, the quantitative assessment of circulating progesterone can provide the discerning farmer and his veterinarian with information they need to make practical decisions concerning the reproductive management of ruminant livestock, viz: i) the early diagnosis of non-pregnancy; ii) determining the resumption of sexual activity post-partum; iii) prediction and confirmation of oestrus; iv) prediction of calving 12 - 24 hours beforehand, so increasing the sensitivity of farmers to the potential danger of dystocia; v) the identification of those with ovarian cysts; and vi) response of animals to various treatments for stimulating or synchronising oestrus.

Immunoassay techniques using radioisotopes (radioimmunoassay-RIA) or enzymes (enzymeimmunoassay-EIA) are used for the determination of progesterone to assist in herd fertility management in many developed countries. However, in developing countries, RIA using 125-I in a solid phase assay is presently the method of choice because the technique is relatively simple, sensitive, reliable and cheap compared with the EIA. Of immense importance in the quantification of progesterone levels in milk and blood is the definition of the collection, preservation and treatment of samples prior to analysis, the inclusion of the analytical laboratory in national or international quality control schemes and the interpretation of assay and progesterone data. When care is taken over these details, one may predict an enormous potential use for progesterone determination and other biotechnological advances in promoting livestock productivity in developing countries.

WORKING GROUP 11

TRANSLOCATION, ACCUMULATION AND RESPIRATION OF LABELLED ASSIMILATES IN WHEAT PLANTS

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ABSTRACT

^{11}C and ^{14}C-labelled CO_2 was fed to the flag leaf of wheat plants. The movement and accumulation of ^{11}C-labelled photosynthetic products could be measured in the living plant using several detectors along the transport pathway. When $^{11}CO_2$ was applied continuously during daytime, the translocation into the ear did not proceed on a steady-state basis. It could be shown that a high uptake rate by the ear reduced translocation towards the roots, whereas a lower uptake rate enhanced the basipetal movement of assimilates.

The respiration of the translocated assimilates through the ear was calculated by feeding the flag leaf with $^{14}CO_2$. During the main filling period, up to 15 % of the labelled C fed to the flag leaf was released by respiration of the ear.

WORKING GROUP 9

RESEARCH ON THE MIGRATION AND HIBERNATION OF PREDATORY BUG PODISUS MACULIVENTRIS SAY USING RADIOTRACER ^{32}P

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ABSTRACT

The predatory bug Podisus maculiventris Say was introduced in Poland in 1978. Basic investigations on its biology and ecology carried out in the Institute for Plant Protection in Poznan, proved a considerable polyphagism of this species. This observation was a basic for further studies on applying P. maculiventris for the reduction of number of different pests.

Several-year investigations concentrated on the question whether the bug is able to winter in Polish climatic conditions and on determining the range of its migrations as well as wintering places.

In the experiments the isotope of phosphorus ^{32}P was used as radiotracer. Adults and larvae of P. maculiventris were labelled internally having been given to drink an aqueous solution of sodium orthophosphate (Na_2HPO_4).

After the release of radioactive individuals into natural conditions, their migration in the field and their wintering places were determined by means of portable battery radiometers.

WORKING GROUP 3

USE OF DNA PROBES IN ANIMAL VIRUS DIAGNOSIS

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ABSTRACT

The detection of specific antibodies to infectious diseases has proved helpful in disease control and eradication programmes. In recent years, however, the use of recombinant DNA technology for the direct detection of antigen has become more common for the diagnosis of viral diseases. The technique involves the identification of nucleic acid in clinical material using complementary nucleic acid strands, radioactive or enzyme labelled, known as probes. Under suitable conditions the probe is able to hybridize with nucleic acid present in the sample and this hybridization is visualised by autoradiography or by colorimetry. The method is very sensitive and specific, useful for rapid indentification and able to distinguish closely related agents as well as different serotypes; the foot-and-mouth disease virus is a typical example where different serotypes and antigenic variations occur. Latent infections can also be detected, like in the case of Aujeszky's disease in pigs. In assay development and for standardization of the technique sophisticated laboratory equipment is essential; however, the test can then easiliy be adapted for use in simply equipped laboratories. This presentation will discuss the development of DNA probe methodology at the Agency's laboratory and the future use of these reagents in developing countries.

WORKING GROUP 4

A NEW AND FAST TECHNIQUE FOR THE DETECTION AND IDENTIFICATION OF ISOMERIC CHALKONES AND FLAVANONES IN MIXTURES

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ABSTRACT

Flavanones are a group of compounds widely distributed among vascular plants and are thought to be involved in plant defence mechanisms/disease resistance. Several synthetic flavanones are also known for their diverse biological importance. The first and foremost constituents isolated from vascular plants are, therefore, the flavanones and their bioprecursors 2'-hydroxy-chalkones which need to be characterized in the subsequent steps by sophisticated chemical and spectroscopic techniques. However, thin-layer chromatography remains an invaluable aid for rapid and inexpensive qualitative analysis of this class of compounds.

Recently, we observed the interconversion of these substituted chalkones and flavanones over silica gel at elevated temperature. Using this isomerization reaction, we have developed a fundamental two dimensional thin-layer chromatographic technique for detection and identification of these isomeric chalkones and flavanones. The technique is best utilized by properly selecting a suitable solvent system and aid for visualization to affect good separation and visibility of spots respectively. Further, if the structure of one component of isomeric pairs is known, that of the other can be easily worked out. The proposed method is simple, inexpensive and needs no sophisticated instruments. In view of the simplicity of the technique, the procedure is likely to find useful place among the existing methods of analysis of these compounds.

WORKING GROUP 7

LEVELS OF ACTIVITIES AND MIGRATIONS OF CERTAIN RADIONUCLIDES IN SOIL IN THE WIDER SARAJEVO REGION

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ABSTRACT

This paper establishes the levels of activity of Cs-137, Cs-134 and K-40 in various soils in the wider Sarajevo region. At each tested locality soil samples were taken at three different depths: 0 - 5, 5 - 10 and 10 - 15 cm. The time of sample taking was spring 1987. After adequate preparation, the level of activity of the tested radionuclides was determined by gamma-spectrometric analysis (GeLi detector).

The obtained results confirm the considerable presence of fission radionuclides in the tested soils, with the highest values in the first tested 1-year. The presence of the fission radionuclides in deeper soil layers shows that these radionuclides partially migrated in the soil.

WORKING GROUP 11

TREE TISSUE CULTURE - A MAJOR TOOL TO SELECT USEFUL VARIANTS?

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ABSTRACT

With increasing concentration of many research laboratories around the world on tree tissue culture within the last few years prospectives for the development of breeding shortcuts to overcome the extremely prohibiting long sexual cycles in many ornamental and fruit as well as most forest tree species have risen again. After a longer period of development of axillary bud propagation systems which tend to produce true-to-type propagules unless treated mutagenically interest has shifted lately to regeneration from smaller structures even from single cells (somatic embryogenesis/ organogenesis from callus or direct organogenesis e.g. from leaf cells and protoplast regeneration). With the development of these additional tools many restrictions for straight forward in vitro selection may become obsolete. Most important of all the chimera problem is easier to handle, secondly the mutagenic treatment may be applied more precisely and even easier by alternative methods. UV or chemical mutagens may replace gamma rays in small structures and single cells. Even synthetical hormones commonly used in tissue culture media are now visualised as mutagens.

While there are no strong objections against such methods in breeding of ornamentals and not even in fruit trees as long as marketable fruit cultivars evolve, we have to face strong concern from forest geneticists against any genetic manipulation of forest tree populations even against the traditional seed provenance selection and planting system. Associated problems will be discussed in the light of experiences with micropropagation of broadleaved trees and basic research in conifer tissue culture.

WORKING GROUP 4

MULTIELEMENT INVESTIGATIONS OF FERTILIZER PHOSPHATES BY MEANS OF INSTRUMENTAL NEUTRON ACTIVATION ANALYSIS (INAA)

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ABSTRACT

The method of neutron activation analysis (NAA) is a powerful tool for the determination of minor and trace elements in nearly all sorts of specimen. Using the instrumental version of the method no chemical preconcentrations or digestions are applied.

The dry samples (0.1 - 0.4 g) are irradiated in the neutron flux of the research reactor and in the fast 14 MeV-neutron facility KORONA at the GKSS Research Center Geesthacht. Up to 44 elements (Na, K, Cl, Ca, Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Zn, Ga, As, Se, Br, Rb, Sr, Ag, Cd, In, Sn, Sb, J, Cs, Ba, up to 10 lanthanides, Hf, Ta, W, Os, Hg, Th, U) can be determined in the phosphate matrix with reactor neutrons after irradiations of 5 minutes and 3 days. Moreover up to 10 major and minor elements (Mg, Al, Si, P, S, Ca, Ti, Mn, Fe, Sr) are determined by fast neutron irradiations. The detection sensitivity differs for every element. The 32 analyzed samples come from phosphate mines in Kola peninsula (USSR), Florida (USA), Marocco, Western Africa and other sites. Six samples are of primary origin (ingeous rocks), 22 of secondary (sedimentary) origin and 3 samples are industrial products. These phosphates are used as fertilizers.

The element concentrations vary enormously according to the origin of the samples. Of special interst are the elements found in the fertilizers: (< 2 - 70 mg/kg), Chromium (< 1 - 2000) Nickel (< 5 - 48), Zinc (< 2 - 600), and Uranium (< 1 - 170).

The input of radioactivity added to the soils by the elements thorium and uranium is compared to the natural background activity. A statistical cluster analysis is tried to order the samples according to their origin.

WORKING GROUP 7

CONTAMINATION OF GAME IN AUSTRIA AFTER THE CHERNOBYL ACCIDENT AND THE "TRANSFER PROBLEM"

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ABSTRACT

Game is known to be a very sensitive bioindicator for contamination with I-131 and especially Cs-137. So after the Chernobyl accident and the extensive contamination of Austrian territory almost immediately a surveillance programme on game was started and has been carried out also in 1987. By these investigations several aims were achieved simultaneously: The geographical distribution of contamination was confirmed and even some unknown critical regions were found additionally. The contamination of game was checked and its dependency on region and time could be used for prognoses and decisions on prohibition of shooting and regarding consumption of game. As a byproduct many parameters could be investigated influencing the contamination of game - e.g. species of animal, dependency on time, age habitat as well as on feeding habits.

Some factors influencing the contamination of game will be discussed. It is concluded from the complexity of natural systems that it is impossible to derive any transferfactors even from a lot of contamination measurement data and use them for quantitative prognosis of contamination. Each prediction can only be on the basis of a qualitative or less than semiquantitative estimation. Measurements of actual contamination levels cannot be replaced by calculations if maximum concentration levels are set. The measures taken by the Austrian authorities regarding game are explained.

WORKING GROUP 4

MEASUREMENT OF ACETATE PRODUCTION IN DOMESTIC ANIMALS BY STABLE-ISOTOPE-MASS-SPECTROMETRY

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ABSTRACT

Acetate, Propionate and Butyrate are the major endproducts of microbial carbohydrate digestion in ruminants. Also in caecum and colon of pigs, the fermentation of carbohydrates is of interest.

Especially the quantitative determination of acetate production gives important informations of the animal's energy metabolism. For measurements of the acetate production rate in large animals, especially if they are free grazing, the application of radioactive substances is impossible. Therefore we developed a tracer dilution technique with stable (1-^{13}C) sodium acetate. In the meantime we applied this method in sheep, pigs and free living camels. All animals were fitted with cannulas, the labelled substances were applicated in as single injections.

Aliquots from rumen resp. colon samples taken out of the cannulas were splitted by preparative gas chromatography into the VFA fractions. For the measurement in the **gas - isotope - mass - spectrometer,** acetate has to be converted to CO_2 by combustion either in a permanent stream of oxygene or in sealed quartz tubes with CuO.

Decreases of ^{13}C-excesses compared with the baseline values between the 1st and 8th hour after marker application were approximated with monoexponential functions to calculate mean daily production rates of acetate. The application of **stable-isotope-labelled** substances opens new dimensions for investigations with animals, because the restrictions caused by dangers of radioactive isotopes have not to be observed.

WORKING GROUP 5

THE EFFECT OF INCREASING RATES OF PHOSPHORUS AND ZINC UPON ZINC AVAILABILITY FOR VINE (REFLECTIONS ON THE A VALUE CONCEPT)

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ABSTRACT

The basic intention of A value - a concept proposed by Fried and Dean - is to obtain a measure of the availability of a soil nutrient in terms of a standard source of the same nutrient, usually a fertilizer. In spite of the belief that this value should be constant as function of the fertilizer rate, Renie D.A. (1970) had experimentally observed that A value varies with fertilizer rate. This effect can be used as a quantitative measure for the environmental factors which influence the availability of a certain nutrient.

The aim of this paper is to present the effect of increasing rates of phosphorus and zinc upon zinc A value variation and to explain the source of this variation. The experiments were pursued in vegetation pots, using a reddish-brown soil (movable P - 40 ppm, 2 n - 2 ppm), and 2 years old vines belonging to Feteasca regala/Kober 5BB cultivar were used as biological material. The rates of phosphorus used were: 50, 100 and 150 ppm, and in case of each level of phosphorus a zinc fertilization was applied in the following rates: 2.5, 5, 10 and 20 ppm. Zinc was applied as zinc sulphate labelled with Zn-65 and phosphorus as monosodic phosphate. The pots were uniformly watered and fertilized with nitrogen and potassium. In vine leaves zinc derived from fertilizer was determined on a Camberra type spectrometer and the chemical content in leaves by atomic absorption spectrophotometry.

Using the method of A value of zinc which allows to estimate the amount of zinc which is accessible for vine, contrary to all expectation, one could notice that A value wasn't independent from the applied rates of phosphorus and zinc. One of the reasons for A value variation is the interaction between the fertilizer applied and soil components, the increase or decrease of A values being the consequence of the unproportional increase or decrease with the rate of the applied fertilizer of the amount of fertilizer inactivated by soil components.

OPENING SESSION

PAST, PRESENT AND FUTURE TASKS OF THE JOINT FAO/IAEA DIVISION

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ABSTRACT

The Joint Division of FAO and IAEA for nuclear applications in agriculture has been in existence for almost a quarter century. It has helped agricultural scientists make use of nuclear technology through an extensive system of coordinated research contracts, each programme concentrating on helping to solve an urgent problem where isotopes and/or radiation could make a significant contribution. Optimum placement, timing and composition of fertilizer applications were revealed; the number of induced mutant varieties doubled every five years and now grown on millions of hectares; large insect-infested areas have been cleared after releases of radiation-sterilized flies; food irradiation is now a fully developed technology and being gradually introduced into commerce. These are a few examples of the impact of nuclear technology in agriculture. New technologies, notably bio-technology depend at nearly every stage on the use of isotopic tracers. Requents for the services and assistance of the Joint FAO/IAEA Division and the Seibersdorf Laboratory from developing countries have steadily increased, making it the largest technical Division of the IAEA and increasingly more active in support of FAO's agricultural development programmes. During the last five years over 1500 agricultural scientists from developing countries have been trained by the Joint FAO/IAEA Division, a large part of the training now taking place at the FAO/IAEA Agricultural Laboratory of Seibersdorf.

WORKING GROUP 3

EFFECTS OF GAMMA RADIATION ON TIBIA FRACTURE HEALING IN DOG AFTER RIGID PLATE FIXATION

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ABSTRACT

It is well known that higher doses of ionizing radiation cause stunting of growth and inhibition of bone healing, while less doses could stimulate these processes. In literature no data could be found about fracture healing in dogs after rigid plate fixation, which were irradiated, bilaterally, with single sublethal dose of gamma rays. The investigations were carried out in 10 cross-bread dogs, of both sexes, at age of 1,5 - 5 years old and body weight of 9 - 12 kg in experimental and 18 - 22 kg in control group. An adequate plate (AO technique) was put on the left intact tibia of all dogs and mid-shaft ostetomy was made with Gileu's saw. The fourth day after surgery the experimental group (n = 6) was irradiated with a single doses of 2 Gy bilaterally gamma radiation (^{60}Co). The fracture healing was being observed clinically, radiographically and microscopically (fracture gap on the end of the examination). The obtained results showed that: 1) bilateral single doses of 2 Gy gamma radiation did not influence the fracture healing under rigid plate fixation, observed clinically; 2) radiographic observation did not show the principal differences between both groups, and 3) histopathological observation showed the differences which point to the facts that sublethal doses of ionizing radiation stimulates the fracture healing.

WORKING GROUP 3

ACTIVITY OF THE BRANCHED-CHAIN ALFA-KETO ACID DEHYDROGENASE IN RAT AND SHEEP LIVER

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ABSTRACT

Differences of metabolism in ruminants and monogastric animals suggest that the pathways of branched-chain amino acids and their derivative keto acids also differ between these two groups.

Since very little is known about the enzymes involved in leucine and alfa-ketoisocaproate in ruminants the purpose of present study was to compare the activity of branched-chain alfa-keto acid dehydrogenase (BCKAD) in the liver of rats and sheep. Activity of this enzyme was calculated as the amount of (1 - 14C) CO_2 released from (1 - 14C) ketoisocaproate as substrate and was expressed in μM CO_2/min./g tissue.

Diet	Animals	BCKAD activity (μM CO_2/min/g tissue total form	actual form
Standard	Rat (6)	569.6 ± 102.4	-
Standard	Sheep (4)	224.6 ± 81.0	-
Enriched with protein	Growing (3) lamb	465.0 ± 99.7	332.0 ± 104.6
Enriched with protein +KIC*	Growing (4) lamb	479.6 ± 54.7	321.6 ± 18.3

*KIC = alfa-ketoisocaproate

In summary, our studies indicate that growing lambs have activity of BCKAD similar to adult rats whereas in adult sheep the activity of BCKAD in the liver is 2.5 times lower ($P < 0.01$) than in young animals. Diet supplemented with KIC does not change the activity of BCKAD.

WORKING GROUP 9

LABORATORY STUDIES DIRECTED TOWARDS THE DEVELOPMENT OF A GENETIC SEXING TECHNIQUE IN THE MEDITERRANEAN FRUIT FLY CERATITIS CAPITATA (WEID.)

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ABSTRACT

An inherited factor thought to be a mutation induced by irradiation of male pupae with 1.4 Krads X-rays, causes excess male production in the progeny of males inheriting it. The gene appears to an example of meiotic drive and is sensitive to temperature: males conditioned at 18 ± 1.5 °C at age 72 - 96 hours of pupal development give rise to significantly more males in their progeny than males raised at the normal laboratory temperature of 26 ± 1.5 °C for the same period. Taking advantage of the low temperature effect, the aim had been to maximise male production by a breeding program based on single pair sib selection.

After 6 generations of selection families G12, G19, G27, G33, G68 showed distortion ranging from 15 - 25 % females. Two generations of outcrossing of these strains with other wild type laboratory strains indicated that the "distorter" gene is Y-linked and also that diffential sensitivity of the X chromosome affects the expression of the gene. Further outcrosses are in progress to isolate an X chromosome with maximum sensitivity to the "distorter". Meanwhile the selected strains G12 and G33, which have been maintained without further selection are reverting towards a normal sex ratio showing 36 % females in generation F_4.

WORKING GROUP 1

THE ROLE OF LINEAR ACCELERATORS IN THE UNITED STATES FOOD IRRADIATION PROGRAMS

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ABSTRACT

The U.S. Food and Drug Administration and the Codex Alimentarius Commission food irradiation regulations specify the irradiation sources acceptable for the treatment process. Photons from the isotopes Cobalt-60 and Cesium-137, and machine source electrons up to 10 MeV and x-rays up to 5 MeV are permitted.

Isotope source irradiation for sterilization of medical products is a mature technology and its use is widespread. Machine sources for crosslinking of plastics, application of films to papers, and numerous other uses is even more widerspread, but the uses of machines for food irradiation are still very limited. The availability of machines for this task in the electron-beam mode is also very limited due to the lack of previous need.

The U.S. Department of Energy Advanced Research Technology Program (ARTP) has the mission to develop and demonstrate food irradiation technology in six regional areas. The sponsors may choose either isotope or machine sources, and two of the sponsors--the Florida Department of Agriculture and Consumers Services and the Iowa State University Meat Technology Center--have already opted for machine sources. Both have specified that as a minimum the machine should be capable of 10 kW of power at 10 MeV and 20 kW at 5 MeV.

Widespread food irradiation facilities could stress the supply of isotope while increasing public concerns about isotopes in general use. Much needed data will be developed on the bremsstrahlung process, and machines as an alternative source will be thoroughly investigated by the two facilities mentioned above.

WORKING GROUP 1

THE STATUS OF FOOD IRRADIATION PROGRAMS AND REGULATIONS IN THE UNITED STATES

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ABSTRACT

The federal and state food irradiation programs in the United States are becoming increasingly more active in nature and broader in scope. The major drivers for these dynamic changes are the promulgation of food irradiation regulations by the U.S. Food and Drug Administration (FDA) and the Food Safety and Inspection Service (FSIS) of the U.S. Department of Agriculture, and the awareness by the U.S. Congress that the technology transfer function must be supported in the areas of demonstration and public information.

Cooperative programs between the U.S. Department of Energy and local sponsors have been mandated and funded by the Congress on a continuing basis in six regions of the United States. These programs are directed toward the demonstrations of the utility of the technology on regional agricultural commodities and on regional problems.

The six local sponsors may choose the source that is most appropriate to their needs of those specified in the FDA and Codex regulations. Two have already selected linear accelerator technology, one will use Cobalt-60 and the remainder are in either the feasibility study or decisionmaking processes. It is anticipated that at least one facility will be operational by January 1990, with the remainder becoming operational throughout the next two years.

WORKING GROUP 12

RENEWED INTEREST IN MUNICIPAL SLUDGE IRRADIATION IN THE UNITED STATES

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ABSTRACT

Water and wastewater treatments are critical to the public health and environmental well being of all countries in the world. The U.S. Environmental Protection Agency (EPA) had active research and technology transfer programs in place a few years ago for municipal sludge treatment, utilization, and disposal before the toxic waste program became a major national priority. Regulations such as 40 CFR 257 were being promulgated identifying the treatments required for the end use desired. Now that the Superfund Programs are in place for the toxic waste problems, the attention of municipalities and federal agencies are again being turned to the problems of municipal sludge disinfection and disposal.

Research programs such as the electron-beam irradiation studies in Dade County, Florida, are being reactivated and better alternatives to current practices are being sought by many local, state, and federal entities for water and wastewater treatment.

WORKING GROUP 5

RESIDUAL EFFECT OF N-FERTILIZER IN CORN-WHEAT ROTATION

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ABSTRACT

The effect of ^{15}N labelled nitrogen fertilizers applied in one crop on yield and fertilizer utilization of the following crop was studied in two field experiments conducted during a three year period on an experimental farm in Central Greece.

In the first experiment the rotation was wheat-corn. Wheat was fertilized with 70 - 280 kg N/ha (ammonium sulphate) while corn was treated uniformly with 150 kg N/ha. Wheat responded positively to nitrogen fertilizer but no significant differences between N levels were observed. The recovery of labelled N in wheat was on an average 42.6 kg N/ha. Corn responded positively to N fertilization. The recovery of the residual labelled N in corn was 4.2 kg N/ha while the recovery of the fertilizer applied at the 2nd crop was 38.1 kg N/ha.

In the 2nd experiment (corn-wheat) corn was fertilized with 75 and 150 kg N/ha using two sources (ammonium sulphate and ammonium nitrate) while wheat was treated uniformly with 120 kg N/ha. There was a positive response of corn to both N sources which increased with higher N levels. The utilization coefficient of the fertilizers increased with N levels. From the tested sources the utilization of ammonium nitrate was slightly higher than that of ammonium sulphate. The recovery for labelled nitrogen in corn was 33.4 kg N/ha and 37.7 kg N/ha for ammonium sulphate and ammonium nitrate respectively. The recovery of the residual nitrogen in wheat, detectable only in the grain, was 1 kg N/ha for both sources while that of the fertilizer applied at the 2nd cropping season was 10 kg N/ha.

In general, the residual nitrogen did not influence yield of fertilizer effectiveness of the successive crop in both experiments. Furthermore the effectiveness of the residual fertilizer was about 10 times less than the effectiveness of the fertilizer applied in the 2nd crop.

WORKING GROUP 8

NON-CONVENTIONAL ENERGY UTILIZATION FOR GREENHOUSES HEATING: METHODOLOGICAL APPROACH TO JUDGING THE ATTRACTIVENESS OF THE INVESTMENT

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ABSTRACT

The paper deals with the utilization of two different non-conventional energy sources that is low temperature reject heat from thermoelectric power stations and low enthalpy geothermal fluids.

For both, the main technical and economical problem is the necessity to carry large quantities of water from the heat source to the utilization site.

In addition the low temperature of the non-conventional sources requires additional investment costs regarding the heat exchangers, thermal insulation and the distribution network.

On the other hand such higher costs need to be balanced from lower management expenses.

Therefore, it seems necessary to perform carefully the benefit/cost analysis in order to judge the attractiveness of the proposed project.

A method to evaluate the limit values of the main parameter that have influence on economical indices is presented.

WORKING GROUP 11

FRUCTAN METABOLISM IN JERUSALEM ARTICHOKE (HELIANTHUS TUBEROSUS L.): TRANSLOCATION OF 14C-ASSIMILATES

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ABSTRACT

Fructans are polymers of fructose with a terminal glucose. They occur in Jerusalem artichoke (Helianthus tuberosus L.) as storage carbohydrates in tubers, stems and roots up to 80 % of dry matter. The fructan metabolism is characterised by a polymerization up to $n = 40 - 60$ during the growth season, mainly in the tubers as the largest storage sinks, and a breakdown of the polymers during dormancy in winter.

In pot experiments the translocation pattern of 14C-assimilates from a single leaf to other parts of the plant was studied in different developmental stages. After different periods of translocation autoradiographic distribution of labelled assimilates and the labelling of various sugars were analysed in stems and tubers. The results show that basipetal transport is favoured above acropetal transport in all growth stages. After entering the stem, the labelled assimilates moved downwards predominantly in three main vascular bundles adjacent to the source leaf (about one quarter of the stem circumference). During all the length of the stem the transport way did not broaden remarkably, indicating a high degree of continuity for the vascular bundles from each leaf to certain tubers.

During the first few hours after $^{14}CO_2$-exposition sucrose had the highest percentage of radioactivity (up to 80 %) among the labelled assimilates in all sink organs. In the leaves and in the youngest part of the stem no oligosaccharides could be detected. In older tissues with high storage capacity the occurence and labelling of monosaccharides decreased whereas fructan formation augmented. Labelled fructans with a high degree of polymerization appeared in roots, stolons, tubers and old stems regularly, but not earlier than one day after $^{14}CO_2$-assimilation. Tubers transferred labelled assimilates faster to highly polymerized fructans than stems or roots. In young tubers high molecular-weight fructans were earlier labelled than in older tubers. Contrary to earlier developmental stages, after flowering there were hardly any assimilates stored in the stem but they were transported directly (though slowly) into the tubers.

WORKING GROUP 2

LYSOZYME AND COMPLEMENT ACTIVITY AT THE IRRADIATED WITH LOW-DOSES GAMMA-RAYS PIGS

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ABSTRACT

The experiments were carried out with 2 months old pigs devided in four groups: controls, vaccinated against salmonellosis, irradiated before vaccination and irradiated after vaccination.

The animals were irradiated by gamma-instalation "Gammatron-3" at 40 rad. The blood was bled before treating and four times in the period of four week. Lysozyme and complement activity (measured by classical and alternative pathways of the complement activation-CPCA, APAC) was determined.

The results showed highest lysozyme activity of control groups in the 2nd week but for experimental groups- in the 3rd week. It is very likely do to the treating. CPCA at control and only vaccinated groups showed highest activity in the 4th week but the other two - in the 3rd week (p 0,95 - 0,99).

These results might be explained also with applied treating. Lysozyme and CPCA activities most strongly increased in the group which was irradiated before vaccination. APAC demonstrated highest activity in the 3rd week in the 4th group. The lack of significant differences between groups showed that there is not any influence on APAC. This might be explained by the fact that phylogenticaly APAC is very old and that for its activation antibodies are not needed.

WORKING GROUP 9

THE ADVANTAGES OF A NEW CYTOLOGICAL APPROACH TO FEMALE MEIOSIS IN SOME DIPTERAN INSECT PESTS

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ABSTRACT

Compared to the information available on male meiosis in insect pests, that for females is virtually non-existent. The reason for this is largely technical. First of all, dividing primary spermatocytes can normally be obtained in large numbers from testicular material whereas oocytes are restricted to one nucleus per egg. Secondly, the presence of yolk surrounding the egg nucleus makes it difficult to handle the oocyte especially when using the traditional squash technique.

Most of these obstacles have now been overcome, however, using a new cytological technique developed by one of us (Southern). Female meiosis in such pests as the Cabbage Root Fly, Onion Fly, Wheat Bulb Fly and Mediterranean Fruit Fly has been shown to provide superb experimental material for the cytological study of meiotic mechanisms.

This paper is devoted to the description of female meiosis in these dipterans from the onset of division, through the process of fertilization and to the fusion of the gametes which establishes the zygote. Special attention is focussed on the diplotene and diakinesis stages when both number and position of chiasmata along each bivalent can be accurately assessed.

Chiasma characteristics are discussed in relation both to population differences and attempts to establish radiation induced chromosome mutant lines.

WORKING GROUP 3

EFFECT OF HCG ON THYROXINE AND TRIIODOTHYRONINE PLASMA LEVELS IN BULLS

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ABSTRACT

The effect of human chorionic gonadotrophin (GCG) on the plasma level of thyroid hormones in bulls was investigated. The experiment was carried out on 10 healthy, Simmental bulls, 2 - 4 years old, kept at the Artifical Insemination Station Velika Plana, Serbia.

Blood samples for triiodothironin (T_3) and thyroxine (T_4) assay were withdrawn by venepuncture of the jugular vein, prior to and 45 minutes after intravenous injection of 8000 I.U. of HCG. Commercialy avilable kits were used for RIA of T_3 and T_4 according to the procedure recommended by the manufacturer.

The mean plasma level of T_3 in bulls before HCG injection was 1.43 ± 0.26 nmol/l, and T_4 was 64.8 ± 7.8 nmol/l. Fourthy five minutes after HCG injection the plasma T_3 and T_4 had risen significantly ($p < 0.01$) and reached mean values: $T_3 = 1.79 \pm 0.27$ nmol/l and $T_4 = 68.5 \pm 7.60$ nmol/l. This rapid rise of the plasma T_3 and T_4 levels after HCG injection indicated that HCG induced in bulls a fast hormone release from thyroid gland, like TSH. Possible mechanism of this action has been discussed.

WORKING GROUP 5

TOTAL SUPPLY OF THE AVAILABLE PHOSPHATES IN SOIL LIMING

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ABSTRACT

The phosphorus availability in liming of acid soils (dark grey forest soils - Luvic Phaeozem according to the FAO classification) having a wide spread in Bulgaria has been studied.

A pot experiment was carried out with variants of 3 levels of introduced phosphorus, variant with liming up to pH = 7, the depth of 0 - 20 cm and 20 - 40 cm were studied, ^{32}P was used as an indicator, culture-oats. The time duration of the experiment was 50 days. Some mathematical equations were checked.

It was established that the liming variants differed with a higher supply of available phosphates compared with the unlimed ones.

The mobility of the abailable phosphates varied in accordance to the content of phosphorus and the mechanical texture. The horizon of 20 - 40 cm - heavier in mechanical texture is of less mobility of the phosphates.

WORKING GROUP 5

SEPARATION OF THE PLANT ORGANIC NITROGEN DERIVED FROM THE ASSIMILATION OF NITRATE AND AMMONIUM IONS I. THE EFFECT OF N-SERVE ON THE PROPORTION OF NH_4 ORIGINATING PLANT ORGANIC NITROGEN

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ABSTRACT

An experiment based on the use of labelled nitrogen was carried out in the greenhouse in order to discriminate the two plant organic nitrogen fractions originating from the assimilation of ammonium and nitrate ions taken up by the plant from soil and fertilizer. For this purpose the following procedure should be observed:

a) labelling the soil NO_3 with $^{15}NO_3$ before seeding
b) determining the plant uptake curves of the total and tracer N against the time in order to calculate graphically their acumulation rates in the plant
c) determining the time variation curve during growth period of the $^{15}NO_3/^{15}NO_3+^{14}NO_3$ ratio of nitrate extracted from the soil with 1 N KCl solution.

The fraction of the plant organic nitrogen derived from nitrate assimilation is the time integral of the ratio between the rate of ^{15}N accumulation in the plant multiplied by 100 and the percent of $^{15}NO_3$ in the total nitrate extracted from the soil.

It was assumed that the tracer nitrogen was taken up by the plant only as nitrate.

The experiment was carried out in 56 pots filled with 10 kg of psammosoil with a high nitrification capacity (T 1/2 ~ 2.5 days). Each pot received 1370 mg of N as $^{14}NH_4{}^{15}NO_3$ with 3.0 % ^{15}N atoms in excess in the NO_3-N ion, and also appropriate amounts of P, K, Mg and B. Half the pots received 3 mg of N-Serve/kg of soil. The test plant was sorghum. A number of 7 samplings of plants and soil, from 8 pots each time (4 with and 4 without N-Serve) were performed throughout the growth period.

The experimental results showed that the proportion of plant organic-N derived from ammonium assimilation in the treatments with and without N-Serve was 26.0 % and 6.5 % respectively. The mixed nutrition of the plant with NH_4 and NO_3 in the treatment with N-Serve, increased the N content, the N accumulation rate the nitrogen derived from nitrate and the dry mass of the plant. Although the initial NO_3-N/NH_4-N ratio was 1.22, the plant took up more NH_4-N than NO_3-N in the first 30 days in the treatment with N-Serve.

WORKING GROUP 2

CHLOROPHYLL MUTATIONS, INDUCED BY THE COMBINED EFFECT OF GAMMA-RADIATION AND N-NITROSO-N-ETHYLUREA IN PHASEOLUS VULGARIS (L.) SAVI

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ABSTRACT

Three year studies were conducted in 1984-1986 to determine chlorophyll mutations, induced by the combined effect of gamma-radiation and N-nitroso-N-ethylurea (NEU) in field variety of bean no. 564.

It was determined that the highest mutation frequency did not correspond to the largest mutation spectrum. A highest mutation frequency was induced by 7 krad gamma-rays + 0,0031 M NEU variant, and a largest mutation spectrum - by 7 krad gamma-rays + 0,00155 M NEU. The preradiational effect of 0,00155 M NEU + 4 krad gamma-rays induced mutations with a higher frequenzy than the postradiational effect of 4 krad gamma-rays + 0,00155 M NEU.

Nine types of chlorophyll mutations were distinguished as a result of the combined effect of gamma-radiation and N-nitroso-N-ethylurea. The mutations were confirmed in M3 generation.

WORKING GROUP 4

DETERMINATION OF BORON AND VANADIUM IN SOIL AND PLANT SAMPLES BY INAA METHOD

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ABSTRACT

An instrumental neutron activation technique - detection of the prompt α-particles with surface barrier silicon and solid state track detectors, detection of the prompt γ-rays with Ge/Li/ detector - based on the $^{10}B/n, \alpha/^{7}Li$ nuclear reaction was applied for boron determination. The investigations - with high sensitivity - were carried out at the Joint Institute for Nuclear Research, Laboratory of Neutron Physics, Dubna, USSR, using a time of flight technique on the IBR-30 pulsing reactor. The method was used for measurements of the boron concentration and distribution.

The analytical measurements for vanadium determinations were carried out at Risö, National Laboratory, Isotope Division, Denmark, using the DR-3 reactor. The activation analytical method, based on the nuclear reaction $^{51}V/n, \gamma/^{52}V$ gives the possibility of the non-destructive V-determination with rather high sensitivity. The quantitative determination limit of this INAA technique for vanadium - taking into account the given conditions - is about 10 ng vanadium.

WORKING GROUP 1

PROSPECTS FOR ELIMINATION OF SALMONELLAE FROM POULTRY MEAT BY IRRADIATION IN POLAND

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ABSTRACT

One of the important factors enabling to optimize irradiation dose needed for elimination of salmonellae from poultry meat is knowledge of frequency and intensity of salmonellae contaminations and knowledge of radioresistance of the most commonly occuring serotypes of salmonellae.
Information on that seems to be insufficient in Poland and the presented project aims to explain these matters.

Poultry carcasses were taken from the abattoir immediately after leaving processing line. Samples of skin around the anal and neck area (25 g) were collected from each carcass. Salmonella were estimated by using the most probable number technique based on ISO standards no. 3565 and 5552. Strains which were considered to be salmonellae, were sent to the National Salmonella Reference Centre in Gdynia for definitive confirmation and typing.

Salmonellae were found in 71 out of 160 tested carcasses (44,4 %). S. typhimurium and S. enteritidis were the most often isolated. Numbers of salmonellae in 1 g of skin in most cases (68,4 %) were less than 3; however, in 4 samples 240 salmonellae per 1 g were found.

At the present moment radiation resistance of isolated Salmonella strains is determined.

WORKING GROUP 1

THE EFFECT OF IRRADIATION ON ANTIBACTERIAL EFFICACY OF SODIUM NITRITE IN CURED MEAT

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ABSTRACT

The results of our previously conducted research demonstrated that high dose irradiation (10 - 50 kGy) considerably decreased both the level of residual nitrite and inhibition of C. botulinum spores in cured meat.

The objective of our presently reported investigations was to compare the growth rate of salmonellae in unirradiated and irradiated samples of cured meat inoculated after high dose irradiation and stored under simulated temperature abuse.

The samples of pork were cured with addition of 0 and 156 mg/kg sodium nitrite, pasteurized for 30 min at 70 °C and irradiated with 0, 10, 20, 30, 40 and 50 kGy. After irradiation the samples were inoculated with S. typhimurium or S. enteritidis and incubated at 20 °C. Numbers of salmonellae were determined after 1, 2 and 3 days of storage.

The obtained results demonstrated that high dose irradiation (10 - 50 kGy) decreases inhibition of S. typhimurium and S. enteritidis in the samples of meat cured with addition of nitrite. The main reason for that seems to be decomposition of nitrite by ionizing radiation, because both in unirradiated and irradiated samples of meat cured without nitrite the same growth rate of salmonellae was observed.

WORKING GROUP 9/10

POSTIRRADIATION ULTRA STRUCTURAL CHANGES IN GONIAL CELLS AND REPRODUCTIVE TRACT OF ACARUS SIRO (L.)

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ABSTRACT

Reproductive organs are particulary sensitive on ionizing radiation. Especially dividing gonial and germinal cells that are still in a process of differentation are particulary radiosensitive and because of their active division they express radiation damage quickly. Postradation reproductive carpacity decrease caused by:
- gonad atrophy
- aspermy
- sperm inactivation
- cytological damages in development and mature gonial cells.

The main problem I wanted to solve during the investigation period was the explanation what kind of disturbance was responsible for sterility of treated Acarus siro mites.

Observations showed that fast electron irradiation induced severe changes in apperance of cristae of treated mites mitochondria. This factor leaded to disruption of the mitochondrial cristae and sometimes was the reason of forming myelin, roundish structure inside matrix (instead of normal cristae). This structure probably derived from broken cristae. Such type of structural postradiation damages in mitochondria is surely one of the major reasons which is responsible for the depression in oxidative phosphorylation and it causes a low level of metabolic activity of cells.

Destroying the normal structure of mitochondrial cristae in developing cells caused retention of spermatogenensis and diminished the number of spermatids in treated mites. Gonial cells needed energy for normal course of spermatogenesis, because during this process many differnt structural and metabolic changes in such cells took place.

WORKING GROUP 9/10

ANATOMY OF ACARUS SIRO REPRODUCTIVE SYSTEM

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ABSTRACT

The present study on A. siro based upon the analysis of serial semithin sections verified at the ultrastructural level have explained many details of morphology ot the female reproductive system and for the first time provided a description of that system in male. Such investigations could serve as a basis for further experimental approach in development of methods for the control of mite populations.

Anatomy and ultrastructure of female and male reproductive system in Acarus siro (L.) were investigated by light and electron microscopy. The female system consists of paired ovaries of nutrimentary type in which oogonia and oocytes are connected by bridges with a large central cell. The oviducts empty to uterus, with its anterior part lined by cuticule and opening as a longitudinal slit (oviporus). Elongated accessory gland composed of the type of secretory cells is located along each oviduct. The copulatory opening occurs at the posterior margin of the body and leads, via inseminatory canal, to receptaculum seminis, consisting of the basal and saccular part. Both inseminatory canal and basal part of receptaculum seminis are lined by cuticle, whereas the wall of the sac is formed by cells covered only by long, numerous microvilli. Basal part of receptaculum seminis joins the ovaries via two lumenless transitory cones.

The male reproductive system contains paired testes, in which spermatogonia tightly surround the central cell. The proximal part of paired vasa deferentia serves as sperm reservoire, while the distal one has a glandular character. Unpaired, cuticle-lined ejaculatory duct opens into the apex of aedeagus. The single accessory gland is located asymmetrically.

The structure of genitial papillae, which are topographically related to genital openings in both sexes, is also briefly described.

WORKING GROUP 11

HERBICIDE RESISTANCE IN WEEDS

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ABSTRACT

Increasing resistance to chlorotoluron has been identified in black-grass (Alopecurus myosuroides) populations at several sites in the U.K.. Experiments with radio-labelled herbicides have shown that there is more degradation and detoxification of chlorotoluron in resistant than in susceptible populations. These processes are inhibited by the P_{450} mixed function oxidase (MFO) inhibitor 1-aminobenzotriazole (ABT) which enhances the phytotoxicity of chlorotoluron in resistant populations. The synergistic effects of other MFO inhibitors are being investigated as potential herbicide adjuvants to overcome resistance. In general, chlorotoluron-resistant stocks demonstrate cross-resistance to a wide range of herbicides of differing modes of action and unrelated chemical structure, which led us to suspect a common mechanism of herbicide detoxification. However, in contrast to previous findings, a chlorotoluron-resistant stock has now been identified which does not show cross-resistance to diclofop-methyl, indicating that more than one herbicide detoxification process might occur in black-grass. The resistance of broad-leaf weeds to triazine herbicides and of chickweed to mecoprop is also being studied at Long Ashton. This work has important implication in developing new strategies to combat the increasing threat of herbicide-resistant weeds and to the possibility of conferring herbicide resistance into selected crops.

WORKING GROUP 7

SELECTED TOPICS ON CHEMICAL RESIDUES IN AGRICULTURE, USING NUCLEAR TECHNIQUES

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ABSTRACT

The Agrochemicals and Residues Section of the Joint FAO/IAEA is coordinating research on chemical residue problems in food and agriculture with a view to improving the safety and efficacy of agrochemicals. In this area, three topics were selected for presentation.

^{14}C-labelled trypanocidal drugs have been used for pharmacokinetic studies in mice, rabbits and steers. The aims have been to determine residual levels in animal tissues, and as tools in developing slow release formulations for long-term prophylaxis in cattle in tsetse infested areas in Africa.

The research on controlled-release formulations of insecticides for tsetse fly control involves the development of fabric screens impregnated with insecticide formulations. The insecticides are protected against loss by photodecomposition, evaporation and leaching with rain water by incorporating oils, lipids and UV screen compounds in the formulations. Of the oils and lipids tested, linseed oil has shown promise by significantly reducing leaching of tested insecticides.

Research coordinated by FAO/IAEA on the behaviour of DDT in tropical environments revealed dissipation patterns which would preclude local accumulation of residues. Utilizing radiotracer and associated techniques dissipation rates in the field were shown to be typically biphasic and much faster than in temperate zones.

WORKING GROUP 2

EFFECT OF ACUT AND RECURRENT GAMMA-IRRADIATION ON THE YIELD COMPONENTS OF FIVE PEA SPECIES

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ABSTRACT

Gamma-irradiation have been applied for induction of genetic variability for a long time. The experiments mostly were directed on qualitative characters. The literature dealing with the reaction of pea-species to recurrent irradiation is not too rich, that's why the authors made experiements in Gödöllö with five pea-species (Dukát, Paloma, Br52, Ujmajor early marrow-fat and Marro). Seeds were irradiated by gamma rays. At all five species we used the same doses: 25 Gy, 50 Gy and 75 Gy. Half of the yield of M_1, M_2, M_3 was sown without repeating the treatment in the breeding garden of the Department of Genetics and Plant Breeding. The other half was irradiated again by the same doses - equal to dose of the previous year. For yield component analysis 30 plants from each treatment and 30 plants from the control were taken under observation. Observing the characters determining yield we found, that:

1. The species responded to the acut and recurrent gamma-irradiation in different ways.
2. The same dose caused positive changes in certain cases while it caused negative changes in other cases.
3. The acut treatment caused positive changes in the yield components of Dukát, Paloma, Br 52 and Ujmajori early marrow.
   The recurrent gamma-irradiation improved some of the yield components of Dukát, Br 52 and Ujmajori early pea species.

WORKING GROUP 8

UTILIZATION OF POWER PLANT THERMAL EFFLUENT TO FISH CULTURE IN POLAND

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ABSTRACT

One of the factors contributing to stabilization of carp production in Poland is utilization, on a scale broader than before, of power plant thermal effluent. This should result in increased production of stocking material, better survival rate of the overwintering fish, and - in consequence - a more efficient utilization of carp ponds.

So far, power plant cooling water has been used in fish farming in Poland on a small scale only. The first centre of this kind, including ponds, a hatchery and a fish growth section, was built in Goslawice in the late sixties. The centre has yielded hatschlings of carp, grass carp, silver carp, and bullhead, as well as rainbow trout fry of up to 10 g individual weight.

Four other farms keeping carp in cages placed in the cooling water canal are located in the vicinity of the Nowe Czarnowo power plant. The farms produce heavy spring carp juveniles (C_1) or marketable fish from summer (C_v) or autumn (C_1) juveniles.

A fish farming centre near the Ostroleka power plant is constructed and located similarly to the peviously mentioned ones. Here, carp is produced as stocking material (from C_v) and marketable fish is obtained from C_1; furthermore, rainbow trout hatchlings are kept up to 10 g individual weight.

At present, a separate fish farm fed with cooling water is under construction along with a power plant in Opole. The farm is designed so as to produce 2-yr-old stocking carp, with an annual output of 600 tonnes. The farm will also include a hatchery for carp and herbivorous fish.

At a small scale, carp farming is carried out in smoke stack cooler basins of the Turoszow power plant. Additionally, the thermal effluent of the Rybnik and Kozienice plants will be used to culture fish in the nearest future.

WORKING GROUP 2

EFFECT OF He/Ne LASER TREATMENT OF WINTER SOFT WHEAT SEEDS ON ULTRASTRUCTURE OF EMBRIO TISSUES AND CHLOROPLASTS OF 11-DAYS OLD SHOOTS

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ABSTRACT

Effect of He/Ne laser treatment of seeds of three soft winter wheat varieties: Sadovo I, Katja and Pobeda is studied in accordance with the ultrastructure of the embrio tissues and the quantitative and qualitative chloroplast characteristics of 11 days shootings. The treatment is carried out with a He/Ne laser equipment with power 25 mW and time of exposure - 2 min, 7 days before the laboratory experiment. 24 hours after the seeds were put to germination samples are taken for the investigation of the embrio tissues; on the 11^{th} day for the electron microscopic investigations of leaf chloroplasts. The growth of embrios and shootings is carried out under controlled photothermostatic conditions.

Ultrastructural observations of coleoptiles and embrio leaves are done. The experimental variants show an advanced differenciation, expressed in a strong cell vacuolization. Changes of the chloroplast structure hasn't been observed. The carried out electron microscopic morphometry exposes a decrease of the chloroplast area and volume of the treated variants.

WORKING GROUP 11

INVESTIGATIONS ON INTERNAL GASTRANSPORT FROM SHOOTS TO ROOTS OF KALLARGRASS (Leptochloa fusca L.) AND RICE

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ABSTRACT

Plantroots and associated nitrogen-fixing microorganisms which are temporarily or permanently flooded, are subjected to oxygen shortage. To overcome the condition of anaerobiosis in the rhizosphere, certain plants develop internal gas space called aerenchyma, which facilitates gasdiffusion within the shoots to the rizosphere. To determine the factors which lead to certain concentrations of gases in the rhizosphere, the diffusion of oxygen, $^{15}N_2$, acetylene and ethylene from shoots to roots was investigated. A clear-cut correlation was found between the volume of rootaerenchyma and the gas partial pressure established in the rhizosphere.
The establishment of certain gasconcentrations (V/V) in the rhizosphere was found to be dependent on:

physical factors like
- the concentration gradient between atmosphere and rhizosphere
- the temperature
- the kind of gas

physiological factors like
- the plant respiration
- the soil oxygen sink, mainly the bacterial respiration and abiotic oxidation processes

morphological factors like
- the permeability of cellwalls
- the porosity of root tissue
- the size of shoot- and rootsurfaces.

Additionally the effect of inoculation of the rhizosphere with the nitrogen-fixing microorganism Azospirillum brasilense Cd was investigated. As a result the percentage of root porosity decreased and the diffusion rate went up, caused by increased permeability of the root cellwalls eventually induced by exudates secreted by the bacteria.

WORKING GROUP 12

CONTEMPORARY PROGRESS AND PERSPECTIVES OF WASTE IRRADIATION PROCESSING

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ABSTRACT

The removal of sulfur and nitrogen oxides from exhaust gasses by electron irradiation has been developed to the pilot plant scale in Japan, USA, BRD and remarkable progress is observed.

Among many proposed waste irradiation technologies in the water processing the following are operating in full scale facilities:

1. The prevention of biofouling into the underground water sources.
2. The hygienization of sewage sludge.
3. The destruction of biologically non-degradable surfactans in the foam phase.
4. The decomposition of cyanides in contaminated underground water.

Radiolytic conversion of polytetrafluorethylene (teflon) and polyisobutylene (butyl rubber) wastes to the valuable and reusable products is practisized in Japan and USSR.

The degradation of cellulose wastes by irradiation in order to enhance the chemical or enzymatic hydrolysis yields was studied intensively but no pilot plant was constructed up to now.

WORKING GROUP 12

RADIATION PROCESSING APPLICATIONS IN THE CZECHOSLOVAK WATER TREATMENT TECHNOLOGIES

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ABSTRACT

The regeneration of biologically clogged water wells by radiation proved to be a successful and economically beneficial process among other promising applications of ionizing radiation in the water supply technology. The application conditions and experience are mentioned.

Some toxic substances in the underground water can be efficiently degradated by gamma radiation directly in the wells drilled as a hydraulic barrier surrounding the contaminated land area. Substantial decrease of CN-concentration and C.O.D. value was observed in water pumped from such well equipped with cobalt sources and charcoal.

The potential pathogenic Mycobacteria occuring in the warm washing and bathing water are resistant against chlorine and ozone. The radiation sensitivity of Mycobacteria allowed to suggest a device for their destroying by radiation.

The removing of pathogenic contamination remains to be the main goal of radiation processing in the water purification technologies. The decrease of liquid sludge specific filter resistance and sedimentation acceleration by irradiation have a minor technological importance. The hygienization of sludge cake from the mechanical belt filter press by electron beam appears to be the optimum application in the Czecholovak conditions. The potatoes and barley crop yields from experimental plots treated with sludge were higher in comparison with using the manure.

Biological sludges from the municipal and food industry water purification plants contain nutritive components. The proper hygienization is a necessary condition for using them as a livestock feed supplement. Feeding experiments with broilers and pigs confirmed the possibility of partial (e.g. 50 %) replacement of soya-, bone- or fish flour in feed mixtures by dried sludge hygienized either by heat or by the irradiation.

WORKING GROUP 1

REMOVING OF SALMONELLA CONTAMINATION IN FISH FLOUR BY MEANS OF IONIZING RADIATION

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ABSTRACT

The very inhomogene distribution of Salmonellas contamination in imported fish flour with the local concentration up to 10^5 bacteria in 1 gram causes great difficulties by the detection and following permission for using the flour as the livestock feed supplement. The dose of 4 kGy either gamma or electron radiation is sufficient to destroy such contamination even in the case of radiation resistant Salmonella Senftenberg.

The technical and economical analysis of several proposed irradiation facilities confirms the advantages of radiation treatment over usual thermal desinfection.

WORKING GROUP 5

UPTAKE AND BALANCE OF APPLIED LABELLED FERTILIZER NITROGEN BY POTATOES ON A CLAYEY SOIL

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ABSTRACT

During two consecutive years, 1985 and 1986, an experiment was conducted to evaluate the uptake of fertilizer nitrogen (NH_4NO_3) by potatoes on a clayey soil (pH H_2O : 7.95; % humus : 1.77; % $CaCO_3$: 3.86 and C/N : 8.6). The fertilized area was 16 m^2 and the amount of fertilizer N was 180 kg ha^{-1} (3.63 At. % N-15 excess) and 150 kg ha^{-1} (5.63 At. % N-15 excess) for 1985 and 1986, respectively. At harvesting time, 4 times 10 plants were taken for analysis. The plants were separated into leafs, stems above ground, stems below ground, roots and tubers. Also the soil profile was analysed for N-15 in layers of 10 cm.

The collected data indicated that the tuber yield was 10 and 13 ton ha^{-1} for 1985 and 1986, respectively. These yields were normal for the clayey area under investigation. The dry matter was mostly located in the tubers (85 %), followed by the areal plant part (13 %). The nitrogen content in the different plant parts was considerably higher in 1986 than in 1985 (190 and 122 kg N ha^{-1} in the tubers). The N-distribution over the different plant parts resembled the dry matter distribution. About 85 % of the N was found in the tubers and about 14 % in the areal part of the plants. The percentic distribution in the plant of the fertilizer N and the soil N was similar for both years, being about 30 for the % Ndff and about 70 % for the % Ndfs.

The fertilizer N recovery was about 25 % in 1985 and about 55 % in 1986, of which about 85 % was located in the tubers. The rest of the fertilizer N was located, in decreasing order, in the leafs, the stems above ground, the stems under ground and the roots. Expecially in 1985, the recovery was rather low. Conditions for N loss through NH_3 formation and for leaching below the rooting zone were more favorable in 1985 than in 1986. Fertilizer N, found up to 120 cm, proofed the movement in the profile. Up to 43 % for 1985 and to 33 % for 1986 of the applied fertilizer N were found in the soil profile.

The total recovery of fertilizer N in plant and soil was 69 and 90 % for 1985 and 1986 respectively. The lower recovery in 1985 was probably due to the unfavorable application. Surface application of fertilizer N on a soil of pH higher than 7 and with free $CaCO_3$ can easily volatilize. Rapid incorporation into the soil is therefore recommended.

WORKING GROUP 5

INFLUENCE OF CD FROM SEWAGE-SLUDGE ON NITROGEN FIXATION IN LUPINUS PLANTS

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ABSTRACT

A green house experiment has been carried out to study the effect of Cd from sewage-sludge on Nitrogen fixation in lupinus plants.

The plants were grown in acid soil (pH = 6,5) in which there were Rh-lupini, so it was not necessary to inoculate them.

All the treatments received the same rate of sewage-sludge (10 tm/ha) and in two of them increasing amounts of Cd artificially - enriched sewage-sludge were added.

As controls to measure the N_2 fixed, lupinus plants without sewage-sludge and cereal plants were used.

All the pots and controls treated received 20 kg N/ha at 5,6 % excess ^{15}N, except the cereal control which received 100 kg N/ha - at 2 % excess ^{15}N.

WORKING GROUP 11

CRITICAL EVALUATION OF TRACER UPTAKE EXPERIMENTS USING $^{36}ClO_3$ AS NITRATE ANALOG

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ABSTRACT

To study nitrate fluxes in plant roots, short-term experiments are a prerequisite because of the expected fast turnover of the cytoplasmic nitrate pool. In some investigations, $^{36}ClO_3$ has been employed as NO_3 analog for this type of experiments due to its advantages e.g. β-counting and long half life as compared to the limitation in production and very short half life time of the only radioactive nitrogen isotope ^{13}N. On the other hand the application of the stable isotope ^{15}N is limited too, due to back ground problems respectively the natural abundance which makes it difficult to discriminate against the small increments of ^{15}N uptake to be expected from diluted solutions. Balance experiments were carried out with different plants to test the reliability of the application of $^{36}ClO_3$ as a NO_3 analog including thin layer chromatography to analyze the tracer composition. The results are discussed in the light of the possible importance of NO_3 efflux by plant roots as means of NO_3 uptake regulation.

CLOSING SESSION

PERSPECTIVES OF BIOMASS UTILIZATION IN AUSTRIA

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ABSTRACT

I. World situation in a nutshell

Austrias energetic and agricultural situation is that of developed countries in a nutshell (high imports of energy and fossile raw materials - and agricultural surpluses).

II. General Aspects

1. Agricultural surpluses as a chance:
(Surpluses + deficits) x (new technologies + new policies) = strategic opportunities (FAST-Report, EEC 1984)
2. The underestimation of the solar energy potential
2.1 The low entropy of sunlight
2.2 The applicability of the equation of Sadi Carnot to estimate the usable energetic potential of sunlight

$$\frac{T_1 - T_2}{T_1} = \frac{6000^{o}\,K - 300^{o}\,K}{6000^{o}\,K} = 0{,}95\ !$$

2.3 4 : 40.000 (20.000)kw !
The influx of solar energy per capita of world population is 40.000 kw. 20.000 kw reach ground level. Average energy consumption in Europe is 4 kw per capita. Ergo - incoming solar energy can over all reasonable energy and organic raw material needs of mankind.
2.4 The present potential of biomass production
2.4.1 Global:

Total biomass	approx. 2000	x 10^9t	or 35	x 10^{21}J
net biomass production	200	x 10^9t	or 3,5	x 10^{21}J
actual consumption	3,7 x 10 t		or 0,065	x 10^{21}J
fossile biomass reserves			25	x 10^{21}J
consumption of fossile biomass/a			0,37	x 10^{21}J

Supply, if 20 % of net biomass production/a were used:
40 x 10^9t or 0,7 x 10^{21}J

Conclusion: All energy and organic raw material needs could be covered.

4.2 Austria (base 1985):
Total gross energy consumption is approx. 1000 PJ.
Imports amount approx. 70 %.
Total enduse of energy: approx. 750 PJ.
Saving potential (of gross energy consumption): approx. 500 PJ.
Total biomass production: approx. 1000 PJ.

The 'increasing potential' of biomass production in Austria can be more than 500 PJ if gardeninglike agricultural methods and labour intensive forestrial cultivation were applied.

Conclusion: All energy and organic raw material needs could be covered.

III. Bioenergy - Chemurgy - Biotechnology in Austria

1. Water power and decentralized biomass power - plants are complementary (lack of hydroelectric power and increased demand for room heating and electricity in winter time - coupling of power and heat in biomass based power-plants using primarily thinning and waste wood as well as straw).
2. Agrofuels
2.1 The improved ethanol-concept (Biosprit^{R} - programme): multiple crop, recycling of stillage, low energy consumption, dry protein fooder as a byproduct, waste-free, deodoration by means of a biofilter.
2.2 The plant oil concept (diesel substitute): Decentralized versus centralized production. Estherification with CH_3OH and C_2H_5OH - glycerol as a bottleneck-byproduct.
3. Chemurgy (Chemical products based on renewable resources and biotechnology)
3.1 Reference to FAST-Report of the EEC (Butterworth 1984)
3.2 The multiple crop and multiple purpose concept (MCMP)
3.3 The medium term concept of 'Naturo-Chemistry' - points of main effort:
- The ethanol-tree
- The lactic acid-tree
- Polyols for polyurethane and other polymers
- Washing aids from carbohydrates and fats
- Substitution of casein by modified plant proteins.

4. Outlook
From petroenergy to bioenergy and from petrochemistry to chemurgy.
'Who does not believe in the future of the use of renewable resources cannot believe in the future of mankind'.
We are called for a paradigmatic strategy.

WORKING GROUP 1

EFFECT OF GAMMA IRRADIATION ON THE FORMATION OF CHOLESTEROL OXIDATION PRODUCTS IN MEAT

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ABSTRACT

At least several compounds may be formed as a result of cholesterol oxidation process. Among these, alpha and beta epoxy derivatives appeared to have the detrimental effect on human health. These compounds are formed as a consequence of oxidation of the beta ring of cholesterol molecule. Since the oxidation of cholesterol in meat through irradiation is also probable, the objectives of research was to verify the hypothesis.

Lean beef meat was irradiated with 50 kGy in Cs-137 gamma source in ambient temperature. After treatment, the natural lipid fraction was extracted using dry column procedure. The separation of cholesterol from its derivatives was performed using high performance liquid chromatography on the basis of refractive index. Identification and quantitative analysis of cholesterol oxides was performed with the use of capillary gas chromatography method - the flame ionization detector was applied.

The preliminary results indicate that the content of most important derivatives, e.g. alpha and beta epoxides, 7-keto and triol was more affected by the origing of sample than by irradiation, in the absolute terms the content of oxides remains within the range of nanograms per gram of meat. Also, while calculating the oxide content with reference to cholesterol concentration, the irradiation appeared not to affect the formation of these compounds. This remains in disagreement with the previous works on the modes system consisting of waster dispersion of stearic acid and cholesterol. In the latter case, the irradiation was influencing not only the amount of oxides formed, but also the ratio of alpha to beta epoxides. Similar reactions seem not to occur in natural biological system as such as the muscle tissue is.

WORKING GROUP 1

BINDING OF METHYLENE BLUE BY NATURAL ACTOMYOSIN GEL IRRADIATED WITH 16 kGy

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ABSTRACT

The information on binding of organic dyes to irradiated protein is limited in spite of the fact, that the method is sensitive enough for the determination of denaturation rate. For example albumin irradiation with doses up to 1.3 kGy in phosphate buffer has reduced the number of malachite green molecules bound to molecule of protein. Also, irradiated actomyosin has reduced its binding ability of methylene blue.

In the described experiment, the gel of natural actomyosin was irradiated with the dose of 16 kGy. Dose level applied was equal to D_{37} for actomyosin extractability from chicken breast muscles in the separate experiment.

Immediately after treatment, the gel was carefully mixed with the solution of methylene blue and transferred into the dialysing sacks then poured in 0.6 M KCL.

Using the thin film dialysis procedure, the desorption curves were calculated.

The results indicate that irradiation of actomyosin gel with 16 kGy reduced the amount of methylene blue bound to 1 mg of protein from 10.08 mg to 5.13 mg. Therefore the problem of usefulness of binding of organic dyes for the purpose of identification of radiation treatment of raw meat should be considered carefuly.

WORKING GROUP 1

EFFECT OF GAMMA IRRADIATION ON FUNCTIONAL PROPERTIES OF BROILER MEAT

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ABSTRACT

The broiler chicken carcasses were irradiated with the doses of 5;10;15;20;30;40 and 50 kGy to select the best fitting relationship between dose and functional properties of meat. Instead of taking the absolute figures, the ratio of No/No was taken for the calculations.

Functional feature	Best fitting function	R^2	Signifance
Free water	N_D = No/1.1964+0.0099D/	0.7639	above 0.05
Water holding capacity	$N_D = \frac{No}{1.0318+0.0424D}$	0.9624	above 0.001
Water retention capacity	$N_D = \frac{No}{1.1594+0.0089D}$	0.7086	above 0.01
Emulsifying capacity	$N_D = \frac{No}{1.0500+0.0103D}$	0.8199	above 0.001
Gellation	$N_D = \frac{No}{1.0465+0.0105D}$	0.9125	above 0.01

The above changes of functional properties are closely connected with alteration of proteins through irradiation.
Therefore the effect of dose on the extractability from the tissue of total protein fraction, as well as miofibrylar and the sarcoplasmic shall be discussed in the presented paper.

WORKING GROUP 5

POTASSIUM AND SULFATE UPTAKE OF WHEAT AND CUCUMBER ROOTS STRESSED WITH NITROGEN AND SULFATE SALTS

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ABSTRACT

The uptake of potassium and sulfate ion were studied in the roots of wheat (Triticum aestivum L. cv. GK Szeged) and cucumber (Cucumis sativus L. cv. Budai csemege) seedlings grown in nutrient solution under nitrogen and sulfate stress conditions.

It was established that the seedlings pretreated with low levels of Na_2SO_4 salt absorbed more K^+(^{86}Rb) ion than those treated with high levels of SO_4^{2-}. In case of $NaNO_3$ pretreatments, however, the reverse is true; that is the seedlings treated with high levels of NO^-_3 absorbed more potassium than those treated with low levels of NO^-_3, which indicates a definite regulation of the K^+ uptake by continuous NO^-_3 and SO_4^{2-} supply of plants. It is remarkable that the $^{35}SO_4^{2-}$ uptake curve of NO^-_3 stressed roots have the same characteristic as those of potassium, while the reverse is true in case of NaCl pretreatment.

As regards the growth and dry matter yields of roots and shoots it was found that nutrient (nitrogen) utilization is strongly influenced by the sulfate supply of plants. Appreciable differences may be experienced, however, between wheat and cucumber seedlings. The optimum sulfate concentration in growth solution is very variable not only between species but for root and shoot too.

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