FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS

UNITED NATIONS
ENVIRONMENT PROGRAMME

Report on

INTERNATIONAL TRAINING FOR CONTROL OF ENVIRONMENTAL CONTAMINANTS IN FOOD

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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as cooperating agency

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This report contains background material and synthesis of the work done by an consultant, Dr. P.E. Andersen during his survey of training institutions and of food ntrol organizations in Australia, Canada, The Federal Republic of Germany, France, India, Kenya, the Netherlands, Sweden, the United Kingdom and the United States of America. It also contains reports on various activities carried out as part of the project on International Training for control of Environmental Contaminants in food, in order to train personnel at post-graduate level in the detection, and analysis of major environmental food contaminants as well as in understanding and applying existing mechanisms for their monitoring and control.

The report describes the work performed to ~~partly~~ meet the urgent need for international training courses in the detection and quantitative determination of environmental contaminants in food. ~~The major thrust~~ of the project was the establishment of a training programme at the Central Food Technological Research Institute (CFTRI), Mysore, India. Two six month training programmes were conducted; the first one from November 1977 to May 1978 and the second one from September 1978 to March 1979. Significant pieces and amounts of analytical equipment were purchased both with project and Government of India funds. A total of 32 fellows from developing countries were trained during the two courses.

Other training activities took the form of individual fellowships and workshops or small group training in English and in French.

Project activities alone included the training component of the UNEP/FAO project on Control of Environmental Contaminants in foods (FP-0107-75-02). Most of these activities were evaluated in order to have a feedback from the beneficiaries and organizers in the various national institutions involved. The two courses, the fellowships and the small group training activities can be judged as successful and participants found their involvement both useful and informative.

Recommendations and general conclusions are given pointing to further training needs in order to enable more developing countries to carry out and expand necessary food contamination control activities.

TABLE OF CONTENTS

IV. Group Training activities: Food Contaminants Analysis (FCA) Courses at the Central Food Technological Research Institute (CFTRI) Mysore, India.

I INTRODUCTION

I.1 GENESIS

The recognition of the problems of food contaminants in many developed countries has been responsible for institution of measures for their control. The quality control of imported foods from developing countries by regulatory agencies and monitoring programmes for certain specific contaminants have made it imperative that the exporting countries adhere to the requirements of the importing countries by inspection, accurate analysis and control measures. The International Training for Environmental Contaminants in Food was envisaged to develop manpower in developing countries to carry out food contaminants analysis. Better food contaminant control will improve food safety and enable avoidance of non-tariff barriers to international trade due to the presence of environmental contaminants. The measures also would enable national Governments to control environmental pollution of food, protect their populations from food hazards and also conserve and better manage national food and agricultural resources. Another aim of the international FCA training was to allow developing countries to eventually participate in the FAO/WHO Food and Animal Feed Contaminants Monitoring Programme which is being developed in cooperation with the UNEP.

In many developing countries at present food control programmes are in existence with some qualified analytical personnel. While there is a need to assist these programmes in other ways, such as updating food laws and regulations, strengthening infrastructure, etc., one of the basic needs for assistance is through better training of qualified analysts. A comprehensive training programme of the type was designed for training of selected individuals from different developing countries to allow quick strengthening of food contaminant analytical capabilities on a broad basis. The participants were usually drawn from the Institutions with on-going programmes and selected on the basis of some analytical experience with a view to augmenting the existing infrastructures.

The FAO-IFTTC (International Food Technology Training Centre) at CFTRI, Mysore, with its long-standing training experience and expertise in the field of pesticide residue analysis, mycotoxin research and its well-equipped analysis and quality control laboratory, provided an excellent location.

The FAO/UNEP Food Contaminants Analysis (FCA) Course further strengthens the institution.

The original project document (English) was translated into French and Spanish at the request of a number of non English speaking countries.

I.2 LONG RANGE OBJECTIVES

1. To enable better control of environmental contaminants in foods, particularly in developing countries; improving opportunities for local and international trade of agricultural commodities and processed foods. Better food contaminant control will increase food safety and enable avoidance of non-tariff barriers to trade due to presence of environmental contaminants.

2. To enable Governments to control environmental pollution of foods and thus conserve and better manage their food and agriculture resources.

3. To strengthen the overall food control capabilities of the developing countries through the training of analytical personnel for national food control services, and through the multiplier effect this personnel will have upon return to their service after training.

4. To allow developing countries to eventually participate in the Joint FAO/WHO International Food Contamination Monitoring Programme being developed in cooperation with UNEP.

5. To facilitate organization of appropriate administrative and legal framework in one of the critical areas of environment, namely food at the national level to fit in with the overall national development plan.

I.3 IMMEDIATE OBJECTIVE

1. Make available as quickly as possible a programme at the international level to train analytical and quality control personnel to control environmental contaminants in food in developing countries.

I.4 FUNDING AND OPERATIONAL RESPONSIBILITIES

The total approximate cost of the project was US Dollars 909,304 of which US Dollars 640,804 were contributed by UNEP and the balance by FAO, and the host Governments. The major Government contributions came from India, the United States of America, France and Tunisia.

This report refers to the contributions made by various experts, consultants and staff members, in the relevant sections.

Progress reports on the project were submitted to UNEP on a quarterly basis. Most of the beneficiaries of fellowships had submitted a report on their performance. The institutions where workshops and group training activities were held have also submitted their report. These reports are available with FAO.

FAO Hqs staff maintained a close supervision of these various training activities and provided suitable technical backstopping.

II IN-SERVICE TRAINING IN CONTROL AND MANAGEMENT OF FOOD CONTAMINATION, PARTICULARLY MYCOTOXINS - INDIVIDUAL FELLOWSHIPS

This activity is the training component of project: Control of Environmental Contaminants in Food: Mycotoxin (FP-0107-75-01), also funded by UNEP. Under this project, provision was made for individual training programmes to specialize fellows from developing countries in fields related to discovery, detection, analysis, monitoring and detoxification of mycotoxins. During the course of project implementation, opportunity was given to several fellows to attend workshops together, beside their training in specific fields. Individual fellowships were also awarded.

A total of 57 fellows were trained as part of this project. The total man/month equivance is 80 as against 114 man/months as initially planned.

Following is a presentation of these activities.

II.1 INDIVIDUAL FELLOWSHIPS

II.1.1. Dr. Hassan Hassanein from Egypt visited three countries in Europe on a study tour to acquaint himself with on-going food and animal feed contamination monitoring programmes in the above countries. His training programme covered biological as well as chemical contaminants, and included theoretical as well as practical inspectional and analytical work. Dr. Hassanein was also exposed to the planning and evaluation aspects of the programme.

Period: 7/1 - 14/2/1978

Places: Federal Republic of Germany
Sweden
The Netherlands
Italy

II.1.2. Mrs. J.R. Santibañez from Mexico to familiarize herself with computer techniques in food contamination monitoring and the statistical basis for developing sampling programmes.

Duration: 1/6 - 26/7/1977

Country: United States of America
Food and Drugs Administration
Washington, D.C.

II.1.3. Mr. Karki, T.B. from Nepal, to study mycotoxins analysis and to carry out research studies on this subject.

Duration: 7/4 - 4/10/1977

Place: USDA, Northern Regional Research Centre, Peoria, USA.

II.1.4. Mrs. Karmacharya, S. from Nepal, to study mycotoxins analysis and to carry out research studies on this subject.

Duration: 30/3 - 4/10/197

Place: Tropical Products Institute, London, U.K.

II.1.5. Mr. Charles Simon Twino Mponela from Zambia, visited the National Public Health Laboratory in Nairobi, Kenya, to acquaint himself with techniques in assembly, operation and maintenance of gas-liquid chromatograph, atomic absorption flame photometer and thin layer chromatograph.

Duration: 10/2 - 10/3/1978

Place: Nairobi, Kenya.

II.1.6. Ofelia M. Alba from Philippines was trained on the USDA programmes on Food Safety and Quality and other food contamination monitoring aspects. With the FDA she discussed and observed food sanitation and contamination programmes, the national mycotoxins programme, the statistical basis for developing sampling programmes. She was also involved in the practical laboratory aspects of the above programmes.

Duration: 3/3 - 22/5/1979

Place: Various places in the USA.

II.1.7. Mr. Luka T. Mulenga and Mr. William D. Ulaya underwent a training programme in food microbiology, in Nairobi, under the supervision of the staff of the Project: FAO/UNEP on control of Environmental Contaminants in Foods in East Africa (UN 32/6 0107/75/07).

Duration: June - July 1978

Place: Nairobi, Kenya.

II.1.8. Mr. F. Kalunga Mambwe, Chief Health Inspector, went on a study tour to observe food control infrastructures works in several countries so that upon his return, he may make appropriate changes in the Zambian food control infrastructures. This opportunity was also used to familiarize Mr. Mambwe with on-going programmes of food contaminant monitoring in the countries which he visited.

Duration: 5/2 - 17/3/1978

Places: USA, Canada, United Kingdom, the Netherlands, Italy and Kenya.

II.1.9. Study travel/training fellowships to three Indian nationals in preparation for the FCA Course at the CFTRI, Mysore. Study travel/Fellowships were awarded as under:

i) Dr. D.S. Chadha, from the Ministry of Health, New Delhi, responsible at a policy level for national activities regarding prevention of food adulteration and carrying out monitoring and surveillance programmes for contaminants in food:

to study development, organization and operation of food control and monitoring programmes, their evaluation and follow-up actions to control potential problem areas;

ii) Drs. H.M. Bhavnagari and K.V. Nagaraja from CFTRI Mysore, responsible for food analysis and day-to-day training of fellows in the course:

to further familiarize themselves and undergo training in sophisticated instrumental analysis, sampling and data analysis techniques and such other specialized disciplines as may be required for successful launching of a national monitoring programme for food contamination.

All the three fellows returned to India before the start of the course in Mysore and were responsible for/or participated in the running of the FCA-course in India.

Duration: 3 months

Places: Canada, United States, United Kingdom, Sweden and the Netherlands.

II.1.10. Study tour for two fellows from CFTRI, Mysore, India

a) Mr. R. Venkatakuppaiah underwent a training in Service maintenance, fault location and repair of HP Model 5982 A gas chromatography/mass spectra manufactured by Hewlet Packard, and of Model HGO Atomic Absorption Spectrophotometer by Perkin Elmer, in the USA. The experience thus gained was expected to strengthen the CFTRI and at the same time served the subsequent FCA courses.

Duration: 21/3 - 28/4/1979

b) Mr. B. Ravindranath underwent a training on operation, maintenance and application of combined gas chromatography and mass spectrometry (Model HP. 5982) and on the operation and application of atomic absorption spectrometry, with emphasis on practical aspects of operation and trouble shooting. His experience would be utilized in the same way as that of Mr. Venkatakuppaiah.

Duration: 21/3 - 28/4/1979

II.2 WORKSHOPS OR SMALL GROUP TRAINING

These workshops or small group training activities were found desirable to focus fellows' attention on particular aspects of mycotoxins, and to provide them with an opportunity to attend an international meeting on the same subject. It was planned to organize these activities in English, French and Spanish.

II.2.1. Workshops or small group training in English

II.2.1.1. First Series

Advantage was taken of a series of workshops organized by:

- the USFDA, in Washington D.C. on methods of analysis of mycotoxins;

- the USDA, in Dothan, Alabama, on methods of handling, sampling for aflatoxins. This activity was also supported by N.C.U. Export Statistics for aspects related to Statistical Quality Control of Sampling;

- AOAC, in Denver, Colorado, where participants attended a workshop on mycotoxins analysis.

Duration: 9/5 - 8/6/1976

Participants: Miss J. Benavides (Costa Rica), Dr. L.R. Delcon and Mr. J. Andrade (Guatemala), Dr. Lilia Albert (Mexico) and Miss Carmunata G. Vizcarra (Philippines).

II.2.1.2 Second Series

The programme for this second series was similar to that of the first one, except that the AOAC workshop was substituted by a US-Japan Symposium on Mycotoxins in Human and Animal Health, Maryland.

Duration: 2/10 - 6/11/1976.

Participants: Mrs. Naty Vega (Costa Rica), Mrs. E.C. De Reyes (Guatemala), Mrs. E.G. Irons (Jamaica), Dr. Stella Barrios (Paraguay) and Mrs. D. Pantovic (Yugoslavia). The total duration for Mrs. Pantovic in the USA was extended to 12/11/76.

II.2.2. Workshops for French speaking countries

Two seminars of this kind were held in Paris (France) in 1977 and in Sousse (Tunisia) in 1978. Both were organized and supervised by Professor Mongi Jemmali, from France.

II.2.2.1. Workshop on control and analysis of mycotoxins in Food, Paris, France, 16 May - 17 June, 1977

The Agence de Coopération Culturelle et Technique (ACCT) sponsored 5 participants out of 20. They also covered expenditures related to honorarium for lecturers and their travel.

An official French association called ACTIM was responsible for the organizational aspect of the workshop.

This programme included lectures, practical laboratory work and field visits. Three working groups were also set to consider the following topics:

I - Factors to be considered for the cost estimate of an analysis

II - Basic equipment for a mycotoxin laboratory

III - Detoxification.

An FAO Headquarters staff member also participated in providing lectures etc.

Details of the programme and the list of lectures is given in Annex.

The following is the list of participants:

- BELAOUDMOU Brahim	- Institut National de Santé Publique Section Nutrition EL MADANIA - ALGER (Algérie)
- BEN ABDALLAH Fayçal	- Coopérative agricole I Z D I H A R 6, avenue Habib Thameur TUNIS (Tunisie)
- BERRADA Mustapha	- Institut Agronomique et Vétérinaire Hassan B.P. 704 RABAT Agdal (Maroc)
- CISSE Nami	- (Mali)
- DIABATE Sory Ibrahim	- C N R Z B.P. 262 SOTUBA - BAMAKO (Mali)
- FARHAT Abdelaziz	- Institut National de Nutrition et de Technologie Alimentaire 11, rue Aristide Briand (Bab Saadoun) TUNIS (Tunisie)
- KANE Ahmadou	- (Sénégal)
- MBAYE Aissatou	- (Sénégal)
- NIAMEOGO Cyrille	- Direction de la Santé Publique Cellule de Nutrition B.P. 7013 OUAGADOUGOU (Haute Volta)
- SENHAJI Ahmed-Faouzi	- Institut Agronomique et Vétérinaire Hassan Section de Technologie Alimentaire B.P. 704 RABAT Agdal (Maroc)
- TABET-DERRAZ Omar	- Institut Pasteur Rue du Dr. Laveran ALGER (Algérie)

Evaluation

An evaluation of the workshop was carried out on the last days. Participants showed high interest in the subject and actively participated in the course. This was due to the high qualification of the lecturers and to their ability to present their subjects in an interesting manner. Participants were also appreciative of the other conditions such as those related to field trips, transportation and accommodation.

II.2.2.2. Workshop on control and analysis of mycotoxins in food, Sousse, Tunisia, 22 May - 11 June 1978.

This workshop was held in Tunisia under the aegis of the Minister of National Education. The Faculty of Pharmacy of the University of Sousse provided training facilities. FAO Regular Programmes funds as well as project resources were used to acquire additional items of equipment.

Twenty-two participants attended. Five out of the 22 participants were sponsored by ACCT. Lecturers were invited from France, Morocco but mainly from Tunisia. The programme included lectures, practical laboratory work and field visits.

Details of the programme as well as a list of lecturers is given in Annex.

List of participants is given below:

- SAVADOGO Omer Ingénieur Agronome	- Direction des Services Agricoles B.P. 7028 Tel: 361.000 Poste 4129 OUAGADOUGOU (Haute-Volta)
- OULD WADDAD Louleïd Vétérinaire	- Directeur du C.N.E.R.V. B.P. 167 Tel: 527.65 NOUAKCHOTT (Mauritanie)
- TLIGUE Mohamed Chimiste	- 50, rue 4339 Cité Ezzouhour - Tunis Tel: 244.322
- ANANI Kouassi Jean	- Microbiologie alimentaire Université au Bénin B.P. 4115 LOME (Togo)
- AGBO Kodjo Doh Nutritionniste	- Direction de la Nutrition et de la Technologie Alimentaire B.P. 1242 Tel: 41.18 LOME (TOGO)
- TOPSY Keswachand Ingénieur Chimiste et Nutritionniste	- Bureau Officiel d'Analyse 10, rue Laboudonnais Tel: 2-4831 2-4921 4-8446 PORT-LOUIS (Ile Maurice)
- KOKOLO Henri	- Chef de Service de Contrôle du Conditionnement B.P. 387 BRAZZAVILLE (Congo)
- SECKA Youssouf Ingénieur des techniques de l'élevage	- C. M. P. A. B.P. 495 Tel: 35 - 38 NJAMENA (Tchad)
- GNINGUE Ibrahim	- Laboratoire de la répression des fraudes B.P. 195 Tel: 203.25.26 DAKAR (Sénégal)

- GUENGUENE Noël Ingénieur agronome phytopathologiste	- Chef de service de la Défense des cultures Ministère de l'agriculture B.P. 786 - Tel: 61-28-00 Poste 86 BANGUI (République centrafricaine)
- BA Lydia Biochimiste	- Responsable du Laboratoire de mycotoxine de l'E.I.S.M.V. B.P. 5077 Fann Tel: 341-31 Poste 222 (Sénégal)
- NGUIMATSIA François Pharmacien-Nutritionniste	- Office national de la recherche scientifique et technique - Laboratoire de nutrition B.P. 193 YAOUNDE (Cameroun)
- HOUARBI Mohamed Ingénieur-Chimiste	- Laboratoire central de Tunis 13, rue de Rome - Tel: 244 - 322 TUNIS (Tunisie)
- BELONG Philippe Biochimiste	- Ministère de la santé Service de la nutrition Tel: 22-22-88 YAOUNDE (Cameroun)
- SANGARE Adêye Chimiste	- Laboratoire Biochimie du Centre National de Recherches Zootechniques (C.N.R.Z.) Sotuba B.P. 262 Bamako (Mali)
- GLASSOU Komi Biochimiste	- Service de Nutrition B.P. 1242 Tel: 4118 LOME (Togo)
- NZE-EKEKANG Luerêne	- B.P. 1935 LIBREVILLE (Gabon)
- MUJAWIYERA Perpétue	- B.P. 292 Tel: 65.45 BUJUMBURA (Burundi)
- KOUADIO Kokora) - YAO-AHOUSSOU Vincent)	- Laboratoire national de la santé publique B.P. V 5 Tel: 35-61-67 ABIDJAN (Côte d'Ivoire)
- SIDIBE Ousseïni Phytopathologiste	- C.N.R.A. - T.A.R.N.A. B.P. 240 - Tel: 410-124/410-280/410-281 MARADI (Niger)
- SAID Salem Assistant	- Faculté de médecine de Sousse Tél: 21.466 SOUSSE (Tunisie)

Evaluation

The workshop programme was followed in a satisfactory manner. The facilities which the Faculty of Medecine put at the disposal of the workshop were adequate. Participants were impressed by the calibre of the lecturers, and the facilities provided by the host institution. They found the subject of the workshop most interesting. They all admitted that with some effort and external assistance, a developing country may successfully organize scientific workshop in a specialized subject such as that of mycotoxins. There is the additional advantage of having a familar environment,in many respects. It was concluded that this experience may be repeated in other developing countries.

The Dean of the Faculty of Medecine expressed the wish that similar scientific manifestations should be organized periodically and offerred to put the facilities available in his department at the disposal of FAO/UNEP or any other international organization for that purpose.

II.3 WORKSHOP FOR SPANISH SPEAKING COUNTRIES

FAO proposal to utilize some of the savings from the project "Control of Environmental Contaminants in Food: Mycotoxins", TF/FP/0107-75-01 for a training workshop in food contaminants analysis for Spanish speaking countries of Latin America was not acceptable to UNEP.

III TRAINING IN FOOD ANALYSIS AND QUALITY CONTROL AT POST GRADUATE LEVEL AS PART OF THE PROJECT ON CONTROL OF ENVIRONMENTAL CONTAMINANTS IN FOOD IN EAST AFRICA

This element of the project was directed toward Kenyan nationals and was meant to train, at a policy level, in advanced systems of food inspection and analysis and in developing programmes to assure adequate food surveillance and monitoring programmes. The following training programmes were implemented:

III.1 TRAINING OF TWO KENYANS IN AUSTRALIA

Messrs. A.O. ODERO and C.L. OMUKOOLO completed a one-year (1976-77) fellowship training in Food Analysis at the University of New South Wales, Australia. Both fellows returned to Kenya in time enough to take an active part in the food contaminant survey programme, a project activity.

III.2 STUDY TOUR FOR TWO KENYAN PUBLIC HEALTH OFFICERS TO THE USA

Mr. P.L. MUNGAI, from the National Public Health Laboratory Services, was given practical training in microbiological analysis of food, milk and water, with special emphasis on the detection and enumeration of indicator and pathogenic organisms. Field training was also given in the collection, shipment, and inspection of food samples for microbiological examination.

Duration of training: 19/3 - 12/8/1978

Mr. D.K. MAINA from the Government Chemist Department was given practical training on pesticide residues analysis (chlorinated, organophosphorus, carbamates and pyrethrins), mycotoxins, toxic metals and other contaminants, using modern instrumental methods.

Duration of training: 19/3 - 12/8/1978

III.3 FELLOWSHIP FOR MR. ALI KIDUKU

Mr. Ali M.A. KIDUKU visited the National Institute of Health, Department of Health, Education and Welfare, and the Agricultural Marketing Service, Department of Agriculture to gain insight as how these agencies are organized and how they carry their functional operations to control contaminants in food.

Duration: 12 - 25/9/1976

III.4 FELLOWSHIP FOR MR. ALI KIDUKU TO COMPLETE A B.Sc. DEGREE IN FOOD SCIENCE

To enable the setting up of a Food Administration Unit within the Ministry of Health, Mr. Ali M.A. KIDUKU was awarded a fellowship to study Food Science and complete the requirements for a Bachelor of Science degree in Food Science at the California Politechnic State University, San Luis Obispo. Mr. Kiduku obtained his B.Sc. degree. While in the State, he also held extensive discussions with people involved in food quality control and contaminant monitoring, through direct contacts, field visits, mid-term seminars, etc.

Duration: 10/9/1978 - 17/7/1980

IV GROUP TRAINING ACTIVITIES: FOOD CONTAMINANTS ANALYSIS (FCA) COURSES AT THE CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE (CFTRI), MYSORE, INDIA.

IV.1 INTRODUCTION

Group training activities represented the most important component of the project. In order for the training to be properly organized, the following activities were carried out:

IV.1.1. Survey of training facilities and of cooperating institutions in North America, Australia, Europe, Africa, Asia and Latin America

Dr. Poul E. Andersen from Denmark was recruited to carry out this mission over the period December 1975 through April 1976 to 13 countries.

IV.1.2. Consultant's terms of reference and work

The terms of reference of the Consultant were:

i) to survey existing training facilities and cooperating food control agencies in some countries with well established systems of food control and monitoring to determine best possible cooperating national agencies and training facilities;

ii) to discuss and make recommendations on arrangements with cooperating agencies and universities for training courses;

iii) to prepare a syllabus for one or more training courses, as required, in collaboration with the national agency(s) and training institution(s) selected for the course(s); and

iv) to prepare a report describing institutions and agencies visited, evaluating various possibilities for training courses, and containing the detailed syllabus for the training course(s) to be carried out.

After discussions, it was agreed that the survey should include selected developed and developing countries which already have food control systems and/or some facilities for food contaminants analysis.

The Consultant visited the following countries:

- Kenya	17-19 December 1975
- Senegal	7- 8 January 1976
- Ghana	8-10 January 1976
- India	11-15 January 1976
- Thailand	15-18 January 1976
- Australia	19-23 January 1976
- U.S.A. (West Coast)	25-30 January 1976
- Mexico	30 January - 6 February 1976
- U.S.A. (East Coast)	6-13 January 1976
- Canada	13-20 February 1976
- Holland	20-24 February 1976
- Hungary	1- 3 March 1976
- Poland	3- 6 March 1976, and
- Denmark	March 1976

He also visited FAO Headquarters in Rome for briefing and debriefing purposes.

IV.1.3. Consultant's report - Summary and conclusions

The consultant's report was presented to UNEP in due course and they expressed their general agreement with his conclusions and recommendations which may be summarized as follows:

With the main purpose of:

a) selecting an adequate place for the project "International Training for Control of Environmental Contaminants in Foods", and

b) drawing the outlines of a syllabus for such a Food Contaminants Analysis course (FCA - course).

The Consultant travelled to thirteen countries during the period December 1975 to April 1976, visiting teaching institutions and government agencies dealing with the analysis and control of high-priority food contaminants, viz. heavy metals, pesticide residues, mycotoxins and biological contaminants.

Based on his findings during the travel, discussions at FAO Headquarters and his previous experience, the Consultant recommends to FAO:

1. That the component of the project "International Training for Control of Environmental Contaminants in Foods" which comprises two six-month FCA - courses, each with 15-20 students, be located at the New South Wales University in Australia and be conducted in close cooperation with the food control authorities of New South Wales and that full collaboration with the Australian Development Assistance Agency (ADAA) should be sought for this purpose.

2. That entrance qualifications for the two courses be:

a) at least a B.Sc. in relevant fields such as analytical chemistry, pharmacy, microbiology, food science or technology and the like;

b) at least three years of work in a food control laboratory in the applicants' own country, preferably at an established government institution dealing with food control activities, to which the applicant will return after completion of the training programme; and

c) an excellent command of written and spoken English.

3. That the FCA - course consists of:

a) a four week preparatory period in order to bring the participants' background to an even level in relation to some important subjects, such as analytical methodology and microbiology and to brush-up other subjects, such as elementary statistical methods and general considerations on food safety;

b) a period of 12-14 weeks for formal training period with lectures on food contaminants, analytical instrumentation and supporting subjects in the mornings and practical laboratory work in the afternoons. One whole day per week should be kept free for visits, seminars and the like;

c) a period of 6-8 weeks for field activities during which the participants will work individually or in small groups with personnel dealing with the practical aspects of food control and food contaminants monitoring and related subjects in the host country.

He proposed the following total workload:

Activity	Week No.	Lectures (hours)	Practicals (hours)	Homework (hours)	Total (hours)
Introduction	1				
Preparatory course	2-5	60	48	80	188
Main course	6-19	189	210	287	686
Field work	20-25		240	24	264
Winding up	26				
Total		249	498	391	1,138
% of total		22	44	34	100

This gives an average weekly work load of 47-48 hours, equivalent to 8 hours per day plus 8 hours during the week-end. This could be considered to be very reasonable for an intensive course such as this.

Work: at the training institution, would include one third of lectures and two thirds of practicals. About one third of the total work load would be done at home.

4. That an assessment of the need and demand for further training in FCA be undertaken, preferably in connection with the selection of participants for the above-mentioned two courses.

On the basis of this report, negotiations were carried out with the University of New South Wales, Australia, the University of Guelph, Canada, Central Food and Nutrition Research Institute (CIVO), Zeist, the Netherlands and the Central Food Technological Research Institute, Mysore, India. It was finally decided in consultation with UNEP that the training courses be organized at the Central Food Technological Research Institute, Mysore in India. Considerable time was spent on these negotiations (1977-78) and UNEP was kept informed. The final courses were organized as a part of the existing International Food Technology Training Centre (IFTTC) at CFTRI, Mysore.

IV.2 PREPARATORY ARRANGEMENTS

The Central Food Technological Research Institute, Mysore, had the necessary capabilities to run the FCA-course in line with the recommendations made by the FAO consultant. As a result of a further survey of the facilities and a series of discussions held in India, it was agreed inter alia that:

a) It would be necessary to provide study travel/training fellowships to three persons from India who would be engaged in different aspects of the training programme (training the trainer) for a period of three m/m each, in Canada, U.S.A. and some other industrialized countries. This recommendation was implemented (See Section II.1.9).

b) It would be necessary to provide some additional equipment to CFTRI Mysore for the training course and place purchase orders as soon as other formalities are complete so that the equipment is delivered and installed well before the start of the first course. (See Section IV-7).

A formal agreement was signed between FAO and the Government of India (CFTRI, Mysore) to implement the training courses.

IV.3 FIRST FCA COURSE

IV.3.1. Organization of the FCA Course

The first FCA (Food Contaminants Analysis) Training Course was held from 21/11/1977 to 20/5/1978.

The provisional programme was provided by the FAO, which contained the following suggestions:

1. a 4-week preparatory period in order to bring the background of the participants to an even level in relation to some important subjects such as analytical methodology and microbiology and to cover other subjects such as elementary statistical methods and general considerations on food safety;

2. a period of 12-14 weeks of formal training with lectures on different aspects of food contaminants and their instrumental analysis and supporting subjects followed by practical laboratory work;

3. a period of 6-8 weeks for field activities during which participants will work individually or in small groups with personnel dealing with the practical aspects of regulatory food control and food contaminants monitoring and surveillance activities and related subjects in the host country; and

4. a round table discussion at the end of the course.

IV.3.2 The FCA Programme and Timetable

IV.3.2.1 Programme

The Course consisted of the following phases:

I Orientation
II Introductory Course
III Pesticide Residue and Monitoring
IV Metal Contaminants and Analysis
V Mycotoxins and Microbiology
VI Field Trips
VII Workshop

The phases of the course were conducted under the supervision of the following Course Coordinators. They were in line with the recommendations of the FAO Consultant.

	Phase	Faculty Incharge
I	Orientation	Majumder, S.K.
II	Introductory & Basic Food Science	Manjrekar, S.P.
III	Pesticide Residues and Monitoring	Majumder, S.K.
IV	Microbial Contaminants and Mycotoxins	Sreenivasamurthy, V.
V	Metallic Contaminants	Kapur, O.P.
VI	Field Visits	Chadha, D.S.
VII	Workshop	Majumder, S.K.

IV.3.2.2 Time Table

The Time Table of the first FCA Course is presented in Annex III. In order to bring together some of the latest advances and trends in the area of environmental pollution and pollution control, one day symposium was organized on the subject. Besides these courses and symposium, technical films on Environment and Contaminants were screened during the FCA Course.

IV.3.3 List of Participants

The following 14 candidates were nominated by their respective governments and participated in the course:

1. Dr. K.C. Guha
   Chief Technical Officer
   Central Food Laboratory
   3 Kyd Street, Calcutta
   INDIA

2. Miss Hernandez Gonzales
Secretaria de Salubridad y
Assistencia
A. Universidad 2505-2 Piso
Chihuahua, Mexico

3. Mr. Mahmud Salameh
Ministry of Supply and Home Trade
Research Directorate
Damascus, Syria

4. Mr. S. Sinyinda
Food and Drug Laboratory
P.O. Box 138
Lusaka, Zambia

5. Mrs. Olga Sanchez Regueiro
Instituto National de Higiene
Epidemilogia y Microbiologia
Infanta 1158
Principe, La Habana, Cuba

6. Mr. Champak Lal Vithalbhai
C/o Principal Res. Officer
Koroniviva Research Station
Fiji Islands

7. Mr. Mohamed Abdul Karim
Inspection, Control and Training
Ministry of Food
16, Abdul Ghani Road
Dacca, Bangladesh

8. Dr. (Mrs) L.D. Nevaskar
"Mon Repos", M-Parviz Road
Poona 411002, India

9. Miss S. Alonzo Reyes
Laboratorio Nacional de la S.S.A.
Calzada de Tlalpan 4493
Mexico 22 D.F.

10. Mr. Dip Jung Shah
Food Research Station
Dept. of Food and Agriculture
Marketing Services
Ministry of Food and Irrigation
Kathmandu, Nepal

11. Miss Chanchai Jaengaswang
Food Analysis Division
Dept. of Medical Sciences
Yodse, Bangkok 1, Thailand

12. Mr. H.B. Campbell
Jamaican Bureau of Standards
6, Winchester Road
Kingston, Jamaica

13. Miss Loreto Dumada-Ug
Food and Nutrition Res. Institute
Taft Avenue Cr.Pedra Gil
Shi Ermita, Manila 2801
Philippines

14. Mr. Lawrence Erzuah Yankey
Ghana Standards Board
Chemical Laboratory
P.O. Box 525, Accra, Ghana

IV.3.4 Evaluation of the First FCA Course and recommendations

During this first FCA Course the programme and time table was prepared closely following the recommendations of the consultant, Dr. P.E. Andersen and further suggestions by FAO. On the basis of the experience gained from the first Course, some modifications were necessary. These are discussed below:

1. During the course it occured that the six months duration was too long for all the participants to stay together in one Hostel or Guest House. Some participants wanted to have their own arrangements for stay outside the Hostel,i.e. in a hotel or private houses in order to satisfy their choice of food and type of accommodation. This was agreed upon by the FAO in January 1978.

2. As the participants were drawn from various countries, the first requirement of the course was to bring them to the same level of understanding. However,the organizers did not receive full background (biodata) of list of participants in time. It would be desirable to obtain full biodata of the participants in advance for midcourse modification if required.

3. Another difficulty arose as all the participants did not reach Mysore prior to the opening date of the course. They came in batches till almost 2-3 weeks of the start of the course. As a result, the orientation course could be imparted only to a few participants. This was, however, compensated by the visit of FAO Staff Member, Dr. R.K. Malik towards the third week of January 1978. It was suggested that in future courses, the FAO Representative should

be available at the beginning of the course.

On the whole,the course content was comprehensive and provided enough insight on various aspects of food contaminants analysis, monitoring and legislation.

IV.3.5.4 Built-in Review and Course modification:

A system of built-in review was provided for in the course. As soon as a particular phase was completed, a review was made with the participants to discuss deficiencies - too much or too little of something - and to identify the topics which could be curtailed or readjusted. A start was made to hold discussions between the participants and the individual Faculty members over dinner at the International Hostel within the CFTRI every week. This had to be discontinued as some of the participants were offered the option of staying on their own outside the Hostel. This partly reduced the advantages of staying together, group discussion among participants, reduced the dinner meetings with faculty and even some library time. A final Workshop was held from May 15 1978 to May 20 1978 which suggested the following:

a) The orientation and introductory phases of the course should be reduced from the current 5 weeks to 3 weeks. In the introductory course content, basic aspects of instruments and instrumentation and statistics lectures should be brought to the minimum.

b) The durations for the Course portions on pesticides, mycotoxins and heavy metals should be extended to 4 weeks each with an additional week on bacterial toxins.

c) In order to provide the selective advanced training according to the requirement of each participant, the participants should also be offered about 5 weeks elective time to specialise in one or two of the food contaminants analysis, such as pesticides, mycotoxins or heavy metals. During this period actual case studies could be designed according to the choice of the individual participant in relation to his/her country situation.

d) Difficulty was encountered when the project instruments and equipment which were meant to supplement the resources of the CFTRI for specific use in the course did not arrive in time. Most of the laboratory exercises were undertaken on CFTRI equipment. The pieces of equipment being used by research scientists of CFTRI being limited and their availability also subject to several constraints, the participants could not be divided into smaller groups to work on this equipment. In order to maintain in each group not more than certain minimum number of participants, additional equipment should be made available.

e) The participants drawn during this course were heterogeneous. A few had broad knowledge of one or two fields. The introductory course was therefore useful. Although, some participants felt that the introductory course could be covered in 2 weeks, it was finally recommended that the course should not be reduced below 3 weeks period, and should be run slowly so that the participants with language difficulty could catch up

with others. Special English Language training would be required for some participants who came from Spanish or French speaking countries.

f) The field trips or study tour were much appreciated. It was however felt that they could be reduced from present 6 weeks duration to 4 weeks. On the basis of review of the field trip results it appeared that the number of centres to be visited could also be reduced to 3 or 4.

g) The budget provision made for the field trip was totally inadequate as the cost of living was much higher than the per diem the participants were receiving in Mysore.

IV - 4 SECOND FCA COURSE

IV-4-1 Organization of the FCA Course

The second FCA Training Course was held from 18.9.78 to 17.3.79.

This course was conducted as a follow-up of the first FCA Course. The Course programme had been revised in order to take into account various discussions held between the faculty members derived from the CFTRI, FAO experts and the participants of the first course and recommendations thereof. The modifications of the programmes, particularly emphasised on the time schedule of various topics of the course, contents, the type of field trips and introduction of elective (specialization).

The provisional programme was as follows:

1. A 3-week preparatory period in order to bring the background of the participants to an even level in relation to some subjects such as analytical methodology, microbiology and to cover other subjects such as elementary statistical methods and general considerations on food safety;

2. A period of 13 weeks of formal training with lectures on different aspects of food contaminants instrumental analysis, and supporting subjects followed by practical laboratory work;

3. A period of 5 weeks of specialised training in the analysis of one of the three major groups of contaminants (Elective -Specialization) at the choice of individual participants.

4. A period of 3-4 weeks for field activities during which participants work individually or in small groups with personnel dealing with the practical aspects of regulatory food control and food contaminants monitoring and surveillance activities and related subjects;

5. A round table discussion at the end of the course.

IV-4-2 The FCA Programme and Timetable

IV 4-2-1 Programme

The Course Programme consisted of seven (7) phases, each of which was conducted under the supervision of the following Course Coordinators.

Phase	Faculty In-charge
I. Orientation	Majumder, S.K.
II. Introductory and Basic Food Science	Manjrekar, S.P.
III. a) Microbial and other biological contaminants in Food and Monitoring	Sreenivasamurthy, V.
b) Mycotoxins in Food and Monitoring	Sreenivasamurthy, V.

IV.	Pesticide Residues in Food and Monitoring	Majumder, S.K.
V.	Metallic Contaminants in Food and Monitoring	Kapur, O.P.
VI.	Field visits	Chadha, D.S.
VII.	Workshop	Majumder, S.K.

IV-4-2-2 Timetable

The Timetable of the Second FCA Course is presented in Annex IV.

In order to assess the degree to which the course could be of use to the participants in their national food contaminants control and monitoring programmes, two days were devoted to discussions of their reports and project proposals on this subject. Besides these courses and project preparation activities, technical films on Environment and Contaminants were screened during the 2nd FCA Course.

IV.4.3 List of participants:

The following candidates were nominated by their respective Governments and participated in the course:

Chile

Mr. Claudio Ricardo Villegas Ferrari
Escuela de Chimica y Farmacia
Departamento Bromatologia y Nutrición
Universidad de Concepción
Casilla 237, Concepción

Cameroon

Mrs. Dorothy Etoke ATABONG
Provincial Chief of Service for Community Development
S.W. Province
Buea
United Republic of Cameroun

El Salvador

Dr. Graciela Chacon Gomes
Jefe Departamento de Bioquimica y Contaminación Ambiental
Professor de Bioquimica y Asociado de Analisis Bromatologico
Facultad deQuimica y Farmacia
Universidad de El Salvador
Ciudad Universitaria
San Salvador

Ethiopia

Mr. Mebtahtu Ogbai
Quality Control Assistant Chemist
Ethiopian Nutrition Institute
P.O. Box 5654
Addis Ababa

India	Mrs. Protima Sengupta Senior Analyst Central Food Laboratory 3, Kyd Street Calcutta-700.016
Kenya	Mr. Jacob Onyango Samba Biochemist National Public Health Lab. Service Ministry of Health, P.O. Box 20750 Nairobi
Malaysia	Miss Noor Rehman binte Abdullah Research Assistant Agricultural Products Utilization Institute Benyclidekan Dan Kemajuan Pertanian (MARDI) Beg 202, Pos Universito, Pertanian Serdang, Selangor
Mauritius	Mr. Bhugwatparsad Jhamma Government Analyst, Min. of Health Government of Mauritius Edith Cavell. St. Port Louis
Mexico	Mr. Hidalgo Hernandez Vicente Sub-Jefe Laboratorios de Residuos Dirección General de Sanidad Vegetal Guillermo Perez Valenzuela 127 Mexico 21, D.F.
Mexico	Mr. Carlos Arciniega* UNU Fellow at CFTRI, Mysore Mexico 21, D.F.
Nepal	Mrs. Urmila Joshi Assistant Food Research Officer His Majesty's Government of Nepal Ministry of Food, Agri. and Irrigation Department of Food and Agri. Marketing Services Food Research Section, Babar Mahal Kathmandu
Philippines	Miss Aida Herreira Balagot Science Research Associate II National Institute of Sci. and Tech. Pedro Gil Street, Manila
Papua New Guinea	Mr. Nelson Barnabas Toreu Agricultural Chemist Dept. of Primary Industry P.O. Box 2417 Konedobu

* Mr.Arciniega was not sponsored by UNEP.

Sudan	Mr. Mutwakil Mohamed Ahmed Research Officer The Chemical Laboratories Min. of Health, P.O. Box 287 Khartoum
Syria	Mr. Mohamed Ahmed Tomeh Head of the Laboratory Staff Min. of Supply & Internal Trade Damascus
Tanzania	Miss Dipti Pabari Government Chemist Grade II Government Chemical Laboratory Min. of Health, P.O. Box 164 Dar-es-Salam

IV.4.4 Elective Course - Specialization

The Elective Courses constituted an innovation in the second FCA course. Participants took advantage of this opportunity to develop some expertise in the analysis of a contaminant of their choice. The distribution of participants for the elective course is as follows:

1. Miss Aida Herreira Balagot (Philippines)
   - Determination of Lead and Mercury contamination in fish stored in earthern vessel

2. Miss Noor Reman Abdullah (Malaysia)
   - Determination of Lead and Mercury contamination in piclkes and mixed vegetables stored in earthern vessel

3. Mr. Bhugwatparsad Jhamma (Mauritius)
   - Quality Control of processed products and vegetable products with special reference to metal contamination such as lead, copper and tin.

4. Mr. Mebrahtu Ogbai (Ethiopia)
   - Determination of copper in oil samples

5. Mr. Galston Mwangi Kenji (Kenya)
   - Determination of cadmium in cereals

6. Mrs. Protima Sengupta (India)
   - Determination of mercury in canned fish

7. Dr. Graciela Chacon Gomez (El Salvador)
   - Bioassay of Mycotoxins

8. Miss Dipti Pabari (Tanzania)
   - Staphylococcus and enterotoxins in milk based traditional sweets

9. Mr. Mutwakil Mohamed Ahmed (Sudan)
   - Sampling Plans and measuring pesticide residues in food and water in Sudan

10. Mr. Mohamed Tomeh (Syria)
    - A preliminary study on pesticide residues in Icecream

11. Mr. Claudio Ricardo Villegas Ferrari (Chile)
    - Screening of fumigant reactivity with food components - Protocol for fumigant introduction in Chile

12. Mr. Vicente Hidalgo Hernandez (Mexico)
    - Selective monitoring programme for pesticides/mycotoxins in foods in Mexico

13. Mr. Nelson Barnabas Toreu (Papua New Guinea)
    - Pesticide in coffee; interference of chlorogenic acid/organo-chlorine Pesticide - A program for monitoring

14. Mrs. Urmila Joshi (Nepal)
    - A plan for a pesticide residue monitoring lab. Comparative sensitiveness of different methods of analysis

15. Mr. Jacob Onyango Samba (Kenya)
    - Methyl mercury: Aquarium: Clean-up

16. Mrs. Dorothy Etoke Atabong (Cameroon)
    - A preventive approach to the reduction of pesticide residues in foods

The results of these studies were presented at a Workshop held at the end of the course.

IV-4-5 Evaluation of the Second FCA Course

IV-4-5-1 Introduction

In this course, EXTRACO's "Built-In Evaluation System" was applied. This consists of a registration form to be completed by the participants at the start of the activity, several - in this seven - subject questionnaires, to cover the various subjects and one final questionnaire to be completed on the activity's last day. In addition, a field trip questionnaire and a lecturer's questionnaire were used. The Management of the course took care of the administering of the various types of questionnaires.

The course ended in a one-week workshop. One of the functions of this workshop was to discuss some main features of the course, with an eye to improving future, similar courses. During this workshop, the EXTRACO Field officer for South-East Asia and the Pacific, Mr. Dirk Blink, was present to compile and analyse the data gathered by means of the questionnaires and to present the analysis to staff and participants.

One characteristic of the "Built-In Evaluation System", namely its ability to provide the course management with data on the course's quality, while it is still in progress and adjustments can still be made, was not taken advantage of, because compilation and analysis of the data were done only at the end. The "management-tool" function of the evaluation exercise did, therefore, not turn out as expected.

IV-4-5-2 The participants

Originally, 18 participants were to take part in the course. However, two participants, one from the Sudan and one from Nigeria, did not arrive. A United Nations University Fellow from Mexico, studying at the Institute, who expressed interest in the course, was admitted as participant. For one participant from Cameroon, a Home Economist, who was selected, but for whom not all parts of the programme were interesting, a special curriculum was designed, although this participant attended the greater part of the course. Therefore, the group numbered 17 people, of which 16 regularly completed the questionnaires.

IV-4-5-3 Homogeneity of the group

The registration form which was completed by the participants before the course started, supplied information about their background, specialization and daily work, about their expectations regarding the course and their possible contribution to make the course a success.

The group of participants was not very homogeneous. Six participants were engaged in work of a higher level than the rest of the group. These six participants were heads of departments of their laboratories or teachers at universities. The other 11 participants were more or less of the same level.

IV-4-5-4 Information about the course

Most participants heard about the course for the first time through FAO/UNDP, either through direct invitation or through publications. Four participants heard about the course through their governments, while the rest were informed by superiors or colleagues. The majority of the participants thought, that they, before the course started, got enough information about it to decide whether it would be of use to them. Three participants received the information late or not at all. Half of the participants did themselves take the initiative in applying for the course. The other half were more or less instructed to attend.

IV-4-5-5 Expectations about the course

The participants were asked to list those subjects in the course programme, from which they expected to benefit most. The pattern of answers to this question shows, that they did not single out any one specific subject as most important, in this sense. The main subjects, Microbial Contaminants and Mycotoxins, Pesticide Residues and Metallic Contaminants, were all mentioned an equal number of times.

The participants wanted to learn more about their own or their laboratories' specialization. If they were not familiar with one or more of the above mentioned subjects, they wanted to know more about them, either because their countries faced difficulties in these fields, or because their countries will start work in these fields soon.

The participants felt that they could contribute to the course best by bringing the specific difficulties and problems, faced by their countries, to the attention of the group.

IV-4-5-6 The course's subjects

The curriculum of the course contained the following subjects:

1. Food Science
2. Statistics
3. Instrumentation
4. Microbial and Mycotoxins contaminants
5. Pesticide Residues
6. Metallic Contaminants
7. Elective Specialization
8. Field Trip

Food Science - As an introduction, the participants considered this subject to be an important and necessary part of the course. Most of the aspects covered in the evaluation of the subject rated satisfactory. The presentation of the subject could have been better.

Statistics - The difference in participants' backgrounds were responsible for the fact that there was no consensus in the group on how to evaluate this subject. For some it was important, for others it was not. Some participants thought that this subject was too theoretical, while others thought that there were too many practicals or exercises. The presentation of the subject rated in-between, because the material was treated in too general a way, with little reference to practical usefulness.

Instrumentation - The participants attributed a lot of importance to this subject. The time available for it was considered to be on the short side.

Microbes and Mycotoxins - All aspects of this subject got a good rating. In additional remarks, some participants stressed the need for protective materials for handling the sample.

Pesticide residues - The participants were clearly not very satisfied with this subject. The presentation of the subject scored low, for which absence of or ill preparation by the lecturers were given as reasons. The theoretical level of this subject

was considered to be too low. The practicals were felt to be not satisfactory, mainly because some of the available instruments did not work and other equipment was lacking. Some parts of the programme for the subject were not covered. As a whole the participants felt that the subject suffered from poor organization and coordination. An exception was made for the Fumigants part of the subject, of which both theoreticals and practicals were well prepared.

Metallic Contaminants - All aspects of this subject got a good rating. Although the participants would have liked the opportunity to work with the advanced equipment like Atomic Absorption Spectrophotometer, VS spectrometer and Polarograph, instead of having them demonstrated only.

Elective Specialization - This special project was not very suitable for evaluation by means of a questionnaire. A rather limited number of questionnaires was returned. Nevertheless it can be concluded that the time available for the subject was considered to be a bit short. Furthermore, that the necessary equipment which was needed in the participants' special projects, was not always available. The participants spent five weeks in preparing and carrying out a research project of their own choice.

Field Trip - Actually there were two field trips, a short one to Coimbatore, Cochin and Bangalore, and a long one to Hyderabad, Delhi, Karnal, Ludhiana, Bombay and Goa. The participants welcomed the chance for visiting the various institutes and laboratories. However, they felt that some of the visits were not worthwhile, because they were duplications (Bombay, Delhi). The accommodation during the field trip was not always considered favourably (Goa). The journey by mini-bus from Goa to Mysore, was considered to be too long and too tiring.

IV-4-5-7 Overall organizational and didactical aspects

In the final questionnaire participants were asked to express their opinion on some organizational and didactical aspects of the course as a whole.

In general the organizational and didactical aspects scored favourably. An exception - though a slight one - was "personal contacts with staff members", which was rated in-between by a majority. The "professional contacts with staff members" were rated good. The practical usefulness of the knowledge acquired during the course was considered to be good. Six participants thought that the level of the training course was rather low, which can be explained by the higher level of their jobs, compared to those of the other participants.

IV-4-5-8 The objectives

The objectives of this course, were nine in total.
The participants thought that these objectives were largely achieved, with the exception of two. The second objective, "To give the participants a broad experience in the control and analysis of pesticide residues in food", was considered to be not satisfactorily achieved, for obvious reasons in the light of the foregoing. The third objective: "To give participants a broad experience in the control and analysis of microbial contaminants in food", was considered to be only partly achieved. This is not surprising, because this was not a real objective of the course. The subject microbial contaminants was alloted only four days in the curriculum.

IV-4-5-9 Suggestion by the Lecturers

The lecturers gave their opinion on the course by completing the lecturers questionnaire. The picture that evolves is a positive one. The size of the group, the selection criteria, and the composition of the group of participants by nationality were judged favourably. The homogenity of the group could be improved according to the staff, especially with regards to the difference in level of the participants. The balance between theory and practice in the curriculum was alright, although the lecturers of the Mycotoxin Section felt that more out-door exercises would be helpful. The staff of the Metallic Contaminants Section would have liked more audio-visual facilities. Some staff members felt the need for some kind of examination or written tests for the participants, to increase their involvement with the course.

IV-4-5-10 The Workshop

The main objectives of the workshop that ended the course were:

1. To give the participants the opportunity to present a status report on the food monitoring and control situation in their respective countries, a report on their special project (Elective Specialization) and a proposal for a follow-up project in a chosen field to be implemented in their countries after their return home.

2. To thoroughly discuss the three types of reports presented by the participants.

3. To inform the participants on the ways the FAO and other UN organizations may be of help to them in setting-up food monitoring and control programmes in their respective countries or improving existing programme.

It can be stated that the workshop succeeded in achieving these goals. The participants felt that a course like this one, could only be a beginning and that there was a need for follow-up in presenting the governments of the countries involved with proposals for a better food monitoring and control system. The difficulties in this field faced by the various countries were discussed in-depth.

IV-4-5-11 Conclusions

It is a pity that the data gathered by means of the various questionnaires were not compiled and analyzed after completion of those questionnaires by participants. This made making adjustments in the programme, while the course was still in the progress, not possible.

The selection of participants was well organized, although the group could have been more homogeneous. Most participants were supplied with enough information about the course. The participants were interested in all three of the main subjects of the course, even though their own work may have been restricted to one of the fields only.

The various subjects covered in the course, rated quite well. Difference in participants' backgrounds was the reason that there was no consensus in the group on how to evaluate Statistics. The subject Pesticide Residues was considered to be poorly organized and coordinated. For the participants, it was important. Elective Specialization was well liked by them, although the necessary facilities were not always available. The accommodation during the field trip was occasionally not up to standard.

The participants were quite satisfied with the overall organization of the course. The objectives, with the exception of two, were considered to be largely achieved.

The workshop at the end of the course succeeded in instilling the notion that follow-up action in the form of proposals for improving existing programmes or setting-up new ones,is necessary.

The conclusion may be drawn, that the main objective of the course, namely: "To give participants the technical knowledge and overall background to enable establishment of better food contaminant monitoring and control programmes in their own countries", was achieved for the best part.

IV-4-5-12 Recommendations

Starting the selection procedure in time and adhering to the participants' profile may ensure, that only participants from the field covered by the Course's subject matter are selected.

Faster communication between FAO headquarters and local FAO offices may help to inform the participants about the nature and the contents of the course in time.

The combination of three types of contaminants in food in one monitoring and control course is a very good set-up. It has to be ascertained however, that all three sections of the programme are organised well, to prevent loss of interest on the side of the participants, in one or more of these sections.

It has to be made sure that the equipment used for demonstrations and practicals in a highly technical course of this type, is available and in good working condition. As much as possible, participants should have the possibility of acquiring experience in operating this equipment, even the very sophisticated equipment.

The time alloted to Instrumentation during the introductory phase should be somewhat extended, while keeping the total number of weeks of the introduction period constant.

The participants should be provided with protective materials for the handling of mycotoxins.

The quality of the accommodation during the field trips should be up to standard, especially for trips of a longer duration.

It may be considered to move the field trip forward in the programme, and plan it before the start of the Elective Specialization. This enables the participants to work on their special project and to present the results, without a period of time in-between.

IV-4-6 General comments on the Workshop and the FCA Course and recommendations for future Courses

1. Participants and representatives of FAO were generally satisfied with the curriculum of the second FCA Course, as well as with its overall organization.

2. The workshop discussed the concepts and mode of setting up monitoring systems, national food control and safety programmes (Netherlands as an example), problems of a regulatory analyst. Information was given on how to prepare programme and projects for national action etc. Main emphasis was on discussion of country status reports on each country of the participants and on the follow-up projects and programmes prepared by the participants. Last part of the workshop was devoted to evaluation of the Course.

3. There were very good discussions on the various topics and all the fellows fully participated. The trainees had spent quite good efforts on the preparation of the country status reports and projects/programmes for follow-up action and there was very profitable interaction between various participants of the workshop. It was agreed that the CFTRI should consolidate the country status reports into one publication.

4. From the workshop it was clear that the main objectives of the Training Course had been largely met. The introduction of elective subject was welcomed but the trainees desired little more time available for it. Field visits were considered most useful. Amongst the topics covered greater satisfaction was shown to the work done on microbial and mycotoxins and on heavy metals.

5. Trainees were generally satisfied with the curriculum and gave some minor suggestions for improvement in the future course to be held, if any.

6. During this course (FCA II) compulsory stay of the participants in the Institute's IFTTC Hostel facilitated communication between the participants. The FCA Course-II was more streamlined with regard to the course content and also direct benefit to the individual participant with special reference to his interest, background and future responsibilities. Preliminary project proposals for follow-up have been prepared by them but would require guidance when they go back to their countries. However, the participants got total view of not only of the subject matter such as pesticides, mycotoxins and heavy metals, analytical techniques but also overview of the planning of their laboratories, orientation of the project samples to fulfil the requirements of FAO/UNEP with respect to achieving the quality control of foods and control of environmental contaminants.

7. The CFTRI faculty members have gained tremendous experience by interaction with the participants of the two FCA courses held in Mysore. The expertise developed for follow-up of such courses should be utilized by the FAO/UNEP and other agencies for future higher training courses in the field of food contaminants. It can also assist monitoring programmes by suitable assistance in terms of personnel, space and fund.

IV-4-7 Equipment

The project budget provides for US$ 113,000 to be used for the purchase of non-expandable equipment. These are to be used for the strengthening of training facilities at the training institution, since training on control of environmental contaminants in foods would involve considerable instrumental analysis.

Prior to the training the CFTRI had basic and modern equipment for the course. The FAO consultant, Dr. Andersen, however noted that two additional instruments would need to be provided as training material. These were : an atomic absorption spectrophotometer and a gaz chromatograph/Mass spectrometer, together with certain spare parts. The Institute had in fact placed an order for one atomic absorption spectrophotometer which became available in September 1977. However, in view of the Institute's heavy committment for research and of certain other programmes, another instrument was felt necessary for the FCA course. An additional list of items of equipment required for the FCA course and of reagents was completed.

The project budget was supplemented with CFTRI's own resources for the purchase of laboratory equipment and reagent for a total value of US$183,000. A list of major items of equipments as well as reagents which were procured under the project is provided under Annex VII.

ANNEX I

WORKSHOP ON CONTROL AND ANALYSIS OF MYCOTOXINS IN FOOD

Paris (France) 16 May - 17 June 1977

Course Programme and List of Lecturers

16 Mai — ACTIM* - 64, rue Pierre Charron - 75008 PARIS
Tél.: 359.97.41

17 Mai — **lieu:** E N S M I C** - 16, rue Nicolas Fortin - 75013 PARIS
Tél.: 707.14.57

- 9H - Ouverture
- Présentation du programme
- 10H - 11H - Les mycotoxines contaminants naturels des aliments (Dr. JEMMALI)
- 11H - 12H - Préparation de plaques couches minces (Dr. JEMMALI)

lieu: E N S M I C

- 14H30-17H30 - Caractéristiques physico-chimiques des principales mycotoxines (document)
- Détermination de concentration de mycotoxines étalon (Dr. JEMMALI)

18 Mai — **lieu:** Laboratoire Central d'Hygiène Alimentaire
43, rue de Dantzig 75015 PARIS
Tél.: 531.82.10

Métro: Porte de Versailles
Bus : No.89 arrêt Morillons-Dantzig

- 9H - 12H - Présentation orale des techniques de dosage de l'aflatoxine M_1 dans le lait et dérivés - multidétection - toxines d'*A. fumigatus* (Mr. FREMY)

lieu: E N S M I C

- 14H30-15H30 - Principaux groupes de mycotoxines (Dr. FRAYSSINET)
- 15H30-17H30 - Dosage des mycotoxines - principe d'extraction, de purification, de séparation, confirmation, dosage, application aux aflatoxines
- Méthode officielle C E E (document) (Dr. JEMMALI)

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* ACTIM : Agence de Coopération Technique et Economique

** ENSMIC : Ecole Nationale Supérieure de Meunerie et des Industries Céréalières

19 Mai — Ascension

20 Mai — lieu: E N S M I C

9H - 12H — Dosage des aflatoxines, zéaralénone dans les aliments (Dr. JEMMALI)

14H30-15H30 — Les mycotoxines et leur répercussion sur la santé humaine et animale (Dr. FRAYSSINET)

15H30-17H30 — Dosage des aflatoxines (suite) (Dr. JEMMALI)

26 Mai — lieu: Muséum National d'Histoire Naturelle
Service de Cryptogamie
12, rue Buffon - 75005 PARIS
Tél.: 331.35.21

9H — Cours de mycologie pratique

Identification de moisissures toxinogènes (Dr. NICOT)

27 Mai — lieu: I T E R G*
5, boulevard de Latour-Maubourg 75007 PARIS
Tél.: 555.07.73

9H - 17H30 — Problème d'échantillonnage

Techniques minicolonnes (Dr. PREVOT)

30 Mai — Pentecôte

31 Mai - 2 Juin

9H - 17H30

Groupe 1 — Laboratoire Central d'Hygiène Alimentaire
43, rue de Dantzig 75015 PARIS
Tél.: 531.82.10
(Mr. FREMY)

Groupe 2 — Institut de Recherches sur le Cancer
16, avenue P.V. Couturier 94800 VILLEJUIF
Tél.: 726.46.58
(Dr. FRAYSSINET)

Groupe 3 — E N S M I C
(Dr. JEMMALI)

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* ITERG : Institut de Technologie, d'Etude et de Recherche sur les Corps Gras.

2 Juin	lieu:	E N S M I C	
		9H - 11H	- Chromatographie (colonne - couche mince - polarité des solvants) (Dr. DRAPRON)
3 Juin	lieu:	E N S M I C	
		9H - 10H	- Contamination des denrées alimentaires par les moisissures toxinogènes (Dr. MOREAU, CNRS* Brest)
		10H - 11H30	- Séminaire sur la prévention des mycotoxines dans les arachides (Dr. GILLIER, I R H O**)
	lieu:	E N S M I C	
		14H30-15H30	- Arachide de bouche - contamination et prévention (Mr. SIEGRIST, S O D E C)
6 - 9 Juin			- Rotation des stagiaires dans les laboratoires (FREMY, FRAYSSINET, JEMMALI)
9 Juin			**- Le contrôle alimentaire et la protection du consommateur (Dr. G.D. Kouthon, FAO)** **- Le contrôle alimentaire, instrument de développement (Dr. G.D. KOUTHON, FAO)** **- La surveillance continue des mycotoxines, dans denrées alimentaires (Dr. G.D. KOUTHON, FAO)**
10 Juin		9H	- Visite à l'I T C F 91920 BOIGNEVILLE - Technologie du séchage (Mr. LASSERAN)
13 Juin	Gare Saint-Lazare Dép.: 7H30 Arr.: 8H30		- Installation Portuaire - Rouen - Aspect déchargement, stockage
14 Juin	lieu:	E N S M I C	
		9H30-11H	- Table ronde sur la détoxification - Problème des contrats d'achat - Techniques commerciales (Mr. CHENUT, Mr. MONIOT - Sté LESIEUR)
	lieu:	E N S M I C	
		14H30-17H30	- Détoxification (Dr. FRAYSSINET, Mr. COLIN, Dr. JEMMALI, Dr. DELORT LAVA)

*** CNRS: Centre National de Recherche Scientifique**
**** IRHO: Institut de Recherche sur les Huiles et Oléagineux**

15 Juin — Gare de l'Est

Dép.: Paris 7H
Arr.: Strasbourg 11H46

Dép.: Strasbourg 19H18
Arr.: Paris 23H18

- Visite de l'Huilerie Alsacienne
Place Henry Levy
67000 STRASBOURG Port du Rhin
Tél.: 16.88.61.48.55

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15 Juin (suite)

14H - 18H — - Dépilliculage - décorticage arachide
(Mr. BAUMANN, Mr. DESTRUELLE)

16 Juin — lieu: Laboratoires WOLFF
198, rue Sigmund Freud
75019 PARIS
Tél.: 206.78.30

9H - 12H — - Dosage aflatoxine par chromatographie liq. haute performance (C L H P)
(Mr. KARLESKIND)

14H40-15H30 — - Effets biologiques des mycotoxines
(Prof. JACQUET)

17 Juin — lieu: E N S M I C

9H - 11 H — - Discussion générale sur le stage - Evaluation - compléments d'informations

11H30 — - Vin d'honneur - remise des médailles/ACTIM

LISTE DES ENSEIGNANTS

- Mr. BAUMANN
  Huilerie Alsacienne
  Place Henry Levy
  67000 - STRASBOURG Port du Rhin
  Tél.: 16 88 61 48 55

- Mr. CHENUT
  Société Lesieur Cotelle
  122, avenue du Général Leclerc
  92103 - BOULOGNE BILLANCOURT
  Tél.: 604.81.40

- Mr. COLIN
  Société Lesieur Cotelle
  122, avenue du Général Leclerc
  92103 - BOULOGNE BILLANCOURT
  Tél.: 604.81.40

- Mr. DESTRUELLE
  Huilerie Alsacienne
  Place Henry Levy
  67000 - STRASBOURG Port du Rhin
  Tél.: 16.88.61.48.55

- Dr. DELORT LAVAL
  I N R A
  Chemin de la Géraudière
  44072 - NANTES CEDEX
  Tél.: 15.40.76.23.64

- Dr. DRAPRON
  I N R A
  au C E R D I A
  Le Noyer-Lambert
  91305 - MASSY
  Tél.: 920.05.23

- Dr. FRAYSSINET
  Institut de Recherches Scientifiques sur le Cancer
  16, avenue P.V. Couturier
  94800 - VILLEJUIF
  Tél.: 726.46.58

- Mr. FREMY
  Laboratoire Central d'Hygiène Alimentaire
  43, rue de Dantzig
  75015 - PARIS
  Tél.: 531.82.10

- Dr. GILLIER
  I R H O
  8, square Pétrarque
  75016 - PARIS
  Tél.: 553.60.25

- Dr. JEMMALI
  - I N R A
    Laboratoire de Technologie Alimentaire
    Service des mycotoxines
    16, rue Nicolas Fortin
    75013 - PARIS
    Tél.: 707.14.57

- Mr. KARLESKIND
  - Laboratoires Wolff
    198, rue Sigmund Freud
    75019 - PARIS
    Tél : 206.78.30

- Mr. LASSERAN
  - I T C F
    91920 - BOIGNEVILLE
    Tél.: 499.41.61

- Mr. MONIOT
  - Société Lesieur Cotelle
    122, avenue du Général Leclerc
    92103 - BOULOGNE BILLANCOURT
    Tél.: 604.81.40

- Dr. MOREAU
  - Faculté des Sciences
    Laboratoire de Biologie Végétale
    29279 - BREST Cédex
    Tél.: 16.98.03.16.94

- Dr. NICOT
  - Muséum National d'Histoire Naturelle
    Service de Cryptogamie
    12, rue Buffon
    75005 - PARIS
    Tél.: 331.35.21

- Mlle PONCE
  - I N R A
    Laboratoire de Technologie Alimentaire
    Service des mycotoxines
    16, rue Nicolas Fortin
    75013 - PARIS

- Dr. PREVOT
  - ITERG
    5, boulevard de Latour Maubourg
    75007 - PARIS
    Tél.: 555.07.73

- Mr. SIEGRIST
  - S O D E C
    3, rue du Dr. Lancereaux
    75008 - PARIS
    Tél.: 766.01.09

- Mme YVON
  - I N R A
    Laboratoire de Technologie Alimentaire
    Service des mycotoxines
    16, rue Nicolas Fortin
    75013 - PARIS

ANNEX II

WORKSHOP ON CONTROL AND ANALYSIS OF MYCOTOXINS IN FOOD

Sousse (Tunisia) 22 May - 11 June 1978

Course Programme and List of Lecturers

Dimanche 21 Mai - Accueil des stagiaires et enseignants à Tunis et Sousse

Lundi 22 Mai

9H30 -10H	- Présentation du programme (Pr. M. JEMMALI)
10H -11H15	- Généralités sur les moisissures (Dr. J. NICOT)
11H15-12H45	- Méthodes d'observation des moisissures (Dr. J. NICOT)
12H45-13H	- Répartition travaux groupes
15H -16H	- Les mycotoxines - Introduction (Pr. M. JEMMALI)
17H -17H15	- Allocution de bienvenue - Madame S. LYAGOUBI-OUAHCHI, Doyen de la Faculté de médecine de Sousse
17H15-17H30	- Monsieur S. BAYAN, Représentant de l'A.C.C.T.
17H30-17H45	- Monsieur le Professeur Z. KALLAL, Directeur de l'Institut National de Nutrition et Technologie Alimentaire
17H45-18H	- Monsieur T. HEINTZ, Représentant de la F.A.O.
18H -18H45	- Allocution d'ouverture - Monsieur le Ministre de l'Education Nationale

Mardi 23 Mai

9H -10H30	- Méthodes de culture des moisissures (Dr. J. NICOT)
10H30-12H30	- Travaux personnels - Examen et ensemencement de matériaux moisis (Dr. J. NICOT, Mme M.J. CHARPENTIER)
14H -17H30	- Rappel de la classification des champignons - Principaux groupes de moisissures - Démonstrations et observations (Dr. J. NICOT)

Mercredi 24 Mai

9H -12H - Les mucorales - Examen de cultures
(Dr. J NICOT)

14H -15H - Chromatographie (principe, colonne, couche mince, polarité des solvants)
(Mr. F. BEN ABDALLAH)

15H -16H30 - Préparation de plaques couches minces
(J.M. FREMY)

16H30-17H30 - Mycoflore et métabolites toxiques
(Pr. M. JEMMALI)

Jeudi 25 Mai

9H -11H - Détermination de concentration de mycotoxines étalons
(Pr. M. JEMMALI)

11H -12H30 - Les champignons imparfaits
(Dr. J. NICOT)

14H -17H30 - Travaux dirigés
(Dr. J. NICOT, Mme M.J. CHARPENTIER)

Vendredi 26 Mai

9H -10H - Classification et identification des groupes Aspergillus et Pénicillium
(Dr. J. NICOT)

10H -12H - Démonstration, observation de cultures
(Dr. J. NICOT, Mme M.J. CHARPENTIER)

14H -15H30 - Dosage des mycotoxines - Echantillonnage - Préparation de l'échantillon
(Mr. E. BOUTRIF)

15H30-17H30 - Dosage des mycotoxines - Principe d'extraction, de purification, séparation, confirmation, dosage - Application aux aflatoxines - Méthode CEE
(Pr. M. JEMMALI)

Lundi 29 Mai

9H -10H30 - Les aspects pathologiques des mycotoxicoses
(Pr. C. FRAYSSINET)

10H45-12H30 - Démonstration: test biologique avec Artémia salina
(Pr. C. FRAYSSINET)

14H30-17H30 - Travaux pratiques - Dosage physico-chimique
(Mme M. YVON, Mr. E. BOUTRIF, Pr. M. JEMMALI)

Mardi 30 Mai

9H -10H30 - Effets biologiques et tests pour apprécier la toxicité à court terme des mycotoxines
(Pr. C. FRAYSSINET)

10H30-12H30 - Démonstration: test dermique sur rats
(Pr. C. FRAYSSINET)

14H30-17H30 - Test d'Ames
(Pr. C. FRAYSSINET)

Mercredi 31 Mai

9H -10H30 - Toxicité à long terme
(Pr. C. FRAYSSINET)

19H30-12H30 - Lecture tests Artémia et dermique
(Pr. C. FRAYSSINET)

14H30-17H30 - Travaux pratiques - Dosage physico-chimique
(Mme M. YVON, Mr. E. BOUTRIF, Pr. M. JEMMALI)

Jeudi 1er Juin

9H -10H30 - Lecture test d'Ames
(Pr. C. FRAYSSINET)

10H30-12H - Travaux pratiques
(Mme M. YVON, Mr. E. BOUTRIF, Pr. M. JEMMALI)

14H30-17H30 - Travaux pratiques - Dosage physico-chimique
(Mme M. YVON, Mr. E. BOUTRIF, Pr. M. JEMMALI)

Vendredi 2 Juin

9H -10H - Contrôle alimentaire en général et inspection des aliments en particulier
(Mr. T. HEINTZ)

10H -12H - Discussion générale - Réglementation - Normes
Présentation des travaux de groupes
Enquête nationale, épidémiologie
(Mr. E. BOUTRIF)

14H -15H - Décontamination des produits pollués par les mycotoxines
(Pr. M. JEMMALI)

15H -17H30 - Travaux pratiques
(Mme M. YVON, Mr. E. BOUTRIF, Pr. M. JEMMALI)

Lundi 5 Juin

9H -11H - La chromatographie liquide haute pression (CLHP)
(WATER ASSOCIATES)

11H -12H - Application de la CLHP aux mycotoxines
(WATER ASSOCIATES)

14H -15H - Répercussions économiques et commerciales des mycotoxines
(Pr M. JEMMALI)

15H -17H30 - Travaux pratiques - Dosage physico-chimique
(Mr. E. BOUTRIF, Pr. M. JEMMALI)

Mardi 6 Juin

9H -10H30 - Prévention de la contamination des récoltes par les mycotoxines au champ
(Mr. P. GILLIER)

10H30-12H - Prévention de la contamination des récoltes par les mycotoxines au cours du séchage
(Mr. P. GILLIER)

14H -17H - Travaux pratiques
(Mr. E. BOUTRIF, Pr. M. JEMMALI)

Mercredi 7 Juin

9H -12H - Technologie du séchage et du stockage
(Dr. A.F. SENHAJI)

14H -17H - Travaux pratiques
(Mr. E. BOUTRIF, Pr. M. JEMMALI)

Jeudi 8 Juin

9H -10H30 - Le contrôle alimentaire dans le contexte du développement national
(Dr. G. KOUTHON)

10H30-12H - Le système des Nations Unies face au problème de la contamination des aliments par les mycotoxines
(Dr. G. KOUTHON)

14H30-17H - Evaluation générale du stage

Vendredi 9 Juin

départ Sousse 7 h - Visite à Tunis de la Coopérative Centrale des semences et plantes sélectionnées et Usine aliments de sevrage

après-midi Libre

Samedi 10 Juin

9H - Visite de l'Institut de Nutrition
Clôture stage
(Pr. Z. KALLAL)

LIST OF LECTURERS

F. BEN ABDALLAH	Coopérative Agricole I Z D I H A R 6, avenue Habib Thameur TUNIS (Tunisie)
E. BOUTRIF	Institut National de Nutrition et de Technologie Alimentaire 11, rue Aristide Briand TUNIS (Tunisie)
M.J. CHARPENTIER	Muséum National d'Histoire Naturelle Laboratoire de Cryptogamie 12, rue Buffon 75005 - PARIS (France)
C. FRAYSSINET	Institut de Recherches Scientifiques sur le Cancer 16, avenue P.V. Couturier 94800 - VILLEJUIF (France)
J.M. FREMY	Laboratoire Central d'Hygiène Alimentaire 43, rue de Dantzig 75015 - PARIS (France)
P. GILLIER	Institut de Recherches pour les Huiles et Oléagineux 8, square Pétrarque 75016 - PARIS (France)
T.A. HEINTZ	F.A.O. Nations Unies 61, boulevard Bab-Benat TUNIS (Tunisie)
M. JEMMALI	Institut National de la Recherche Agronomique Laboratoire de Technologie Alimentaire Service des mycotoxines 16, rue Nicolas Fortin 75013 - PARIS
G.KOUTHON	F.A.O. Via delle Terme di Caracalla 00100 - ROME (Italie)
J. NICOT	Muséum National d'Histoire Naturelle Laboratoire de Cryptogamie 12, rue Buffon 75005 - PARIS (France)
A.F. SENHAJI	Institut Agronomique et Vétérinaire HASSAN II Section de Technologie Alimentaire B.P. 704 RABAT-AGDAL (Maroc)

WATER ASSOCIATES

18, rue Goubet
75019 - PARIS (France)

M. YVON

Institut National de la Recherche Agronomique
Laboratoire de Technologie Alimentaire
Service des mycotoxines
16, rue Nicolas Fortin
75013 - PARIS (France)

ANNEX III

FIRST FCA COURSE

Mysore (India) 21 November 1977, 7 April 1978

(Timetable, List of External Lecturers, Field Visits, Workshop, Documentation, Symposium)

T I M E T A B L E

Date and Time	Subject	Faculty
1	2	3
	I. ORIENTATION	
21.11.1977 - Monday		
0900-1030	Registration	Manjrekar, S.P.
1030-1300	Visit to the Institute	Nair, V.S.
1400-1500	Meet the Director	Amla, B.L.
1500-1700	Outline of the Course Content	Majumder, S.K.
22.11.1977 - HOLIDAY		
23.11.1977 - Wednesday		
0900-1030	Intrinsic toxic factors in Foods (L)	Subramanian, N.
1100-1230	Metal contaminants in Foods (L)	Kapur, O.P.
1400-1530	Foreign chemicals in foods (L)	Majumder, S.K.
1600-1730	Mycotoxins and microbiological contaminants (L)	Sreenivasamurthy, V.
	II. INTRODUCTORY & BASIC FOOD SCIENCE	
24.11.1977 - Thursday		
0900-1030	Major and minor constituents of foods (L)	Manjrekar, S.P.
1100-1230	Moisture in foods (L)	Krishnamurthy, M.N.
1400-1700	Moisture determination (P)	-do-
25, 26 & 27.11.1977 - HOLIDAYS		
28.11.1977 - Monday		
0900-1030	Chemistry of carbohydrates - Introduction (L)	Subba Rao, D.
1100-1230	Chemistry of monosaccharides (L)	-do-
1400-1700	Determination of sugars (P) (Polarimetric and Colorimetric)	Krishnamurthy, M.N. Subba Rao, D.

1	2	3
29.11.1977 - Tuesday		
0900-1030	Chemistry of Disaccharides (L)	Subba Rao, D.
1100-1230	Chemistry of starches (L)	-do-
1400-1700	Sugar analysis (P)	-do- Krishnamurthy, M.N.
30.11.1977 - Wednesday		
0900-1030	Chemistry of other polysaccharides (L)	Subba Rao, D.
1100-1230	-do-	-do-
1400-1700	Analysis of starches, including microscopy (P)	Subba Rao, D. Krishnamurthy, M.N.
1.12.1977 - Thursday		
0900-1030) 1100-1230)	Chemistry of glycosides (L)	Sakariah, K.K.
1400-1700	Determination of alcohol-insoluble solids (P)	Ramaswamy, H.S.
2.12.1977 - Friday		
0900-1030	Proteins - Introduction (L)	Narasinga Rao, M.S.
1100-1230	Chemistry of amino acids (L)	Subba Rao, D.
1400-1700	Analysis of amino acids (P) (Qualitative tests, paper chromatography, Amino acid Analyser)	Subba Rao, D. Sakariah, K.K.
3, 4.12.1977 - HOLIDAYS		
5.12.1977 - Monday		
0900-1030	Chemistry of polypeptides (L)	Subba Rao, D.
1100-1230	Chemistry of proteins (L)	Narasinga Rao, M.S.
1400-1700	Analysis of amino acids (P) (Formol titration, microbiological assay)	Sakariah, K.K. Srinivasan, K.S.
6.12.1977 - Tuesday		
0900-1030	Denaturation of proteins (L)	Narasinga Rao, M.S.
1100-1230	Chemistry of some typical food proteins (L)	Subba Rao, D.
1400-1700	Protein estimations (P or D) (Electrophoretic separation of proteins, available lysine)	Sakariah, K.K. Srinivasan, K.S.
7.12.1977 - Wednesday		
0900-1030	Introduction to lipids (L)	Subba Rao, D.
1100-1230	Chemistry of fatty acids, rancidity, antioxidants (L)	-do-
1400-1700	Estimation of crude fat in foods (P)	Subba Rao, D. Krishnamurthy, M.N.

1	2	3
8.12.1977	- Thursday	
0900-1030	Chemistry of lipids (L)	Subba Rao, D.
1100-1230	Chemistry of lipids - phospholipids and others (L)	Krishnamurthy, M.N.
1400-1700	Analysis of lipids (P)	-do-
9.12.1977	- Friday	
0900-1030	Minerals in foods (Ca, P, Fe) (L)	Subba Rao, D.
1100-1230	Trace elements in foods (L)	Krishnamurthy, M.N.
1400-1700	Estimation of phosphorus and iron (P)	Subba Rao, D. Krishnamurthy, M.N.
10 & 11.12.1977	- HOLIDAYS	
12.12.1977	- Monday	
0900-1030	Polyphenols in foods (L)	Subba Rao, D.
1100-1230	Natural pigments in foods (L)	Sakariah, K.K.
1400-1700	Estimation of tannins in foods (P)	Krishnamurthy, M.N.
13.12.1977	- Tuesday	
0900-1030	Chemistry of vitamins - Introduction (L)	Sakariah, K.K.
1100-1230	Vitamins - A, D, E, K (L)	-do-
1400-1700	Estimation of carotenoids (Column chromatography) (P)	Sakariah, K.K. Krishnamurthy, M.N.
14.12.1977	- Wednesday - FOOD CONTAMINANTS SYMPOSIUM	
15.12.1977	- Thursday	
0900-1030	Chemistry of Enzymes - Introduction (L)	Sakariah, K.K.
1100-1230	Some typical plant and animal enzymes (L)	-do-
1400-1700	Estimation of polyphenolase/peroxidase (P)	Nath, N. Ramaswamy, H.S.
16.12.1977	- Friday	
0900-1030	Major nutrient pathways (L)	Sakariah, K.K.
1100-1230	Quality and importance of water (L)	Krishnamurthy, M.N.
1400-1700	Analysis of potable water (P)	-do-
17 & 18.12.1977	- HOLIDAYS	

1	2	3
19.12.1977 - Monday		
0900-1030	Principles of food preservation (L)	Setty, Lakshminarayana
1100-1230	Food Processing Operations (L)	Gupta, T.K.
1400-1700	Dehydration of Foods (D)	Setty, Lakshminarayana Misha, M.C. Gupta, T.K.
20.12.1977 - Tuesday		
0900-1030	Quality parameters in foods (L)	Govindarajan, V.S.
1100-1230	Effect of handling, processing and storage on food quality (L)	Ranganna, S.
1400-1700	Sensory evaluation of foods (L)	Govindarajan, V.S.
21.12.1977 - Wednesday		
0900-1030	Food microbiology - Introduction (L)	Manjrekar, S.P.
1100-1230	Growth and death of microorganisms (L)	-do-
1400-1700	Inoculation, isolation and staining techniques (P)	Manjrekar, S.P. Rahim, Vaseema
22.12.1977 - Thursday		
0900-1030	Physical and chemical factors affecting growth and death of microorganism (L)	Manjrekar, S.P.
1100-1230	Microbial spoilage of foods (L)	Rahim, Vaseema
1400-1700	Isolation of some typical food spoilage organisms (P)	Manjrekar, S.P. Rahim, Vaseema
23.12.1977 - Friday		
0900-1030	Food infections and intoxications (L)	Dwarakanath, C.T.
1100-1230	-do-	-do-
1400-1700	-do- (P)	-do-
24 & 25.12.1977 - HOLIDAYS		
26.12.1977 - Monday		
0900-1030	Food contamination (L)	Sreenivasamurthy, V.
1100-1230	Some pathological effects (L)	-do-
1400-1700	Assessment of level of intake of contaminants via food through food contamination survey (L/P)	Majumder, S.K. Kapur, O.P.
27.12.1977 - Tuesday		
0900-1030	Basic laboratory management (L)	Ranganna, S.
1100-1230	Safety in the chemistry laboratory (L/D)	Majumder, S.K.
1400-1700	Elementary laboratory instrument repair (L/D)	Venkatakuppiah, R.

1	2	3
28.12.1977 - Wednesday		
0900-1030	Basic laboratory management and safety in microbiological laboratory (L/D)	Sreenivasamurthy, V.
1100-1700	Laboratory instrument repair (D)	Venkatakuppiah, R. Poonacha, J.M.
29.12.1977 - Thursday		
0900-1700	Library work on food chemistry and microbiology	Subba Rao, D. Manjrekar, S.P.
30.12.1977 - Friday - Consultations, discussions and evaluation		
31.12.1977 & 1.1.1978 - HOLIDAYS		
Statistical Methods		
2.1.1978 - Monday		
	Statistics in the control of environmental contaminants in food (L)	Srihari, B.R. Rajalakshmi, D.
3 & 4.1.1978 - Tuesday & Wednesday		
	Statistical hypotheses and tests	-do-
5 & 6.1.1978 - Thursday & Friday		Srihari, B.R. Rajalakshmi, D.
	Statistical sampling a) Methods and application b) Acceptance sampling procedures	
7 & 8.1.1978 - HOLIDAYS		
9.1.1978 - Monday		
	Statistical quality control: Methods and applications	-do-
Basic Toxicology		
10.1.1978 - Tuesday		
0900-1700	Principles and techniques in toxicology (L)	Sreenivasamurthy, V. Krishnakumari, M.K. Jayraj, P.
Food Legislation, Regulation, Standards and Control		
11.1.1978 - Wednesday		
0900-1030	Food Legislation and Regulation and Codex Alimentarius Model Food Law (L)	Malik, R.K.
1100-1230	Food Standards (L)	Chadha, D.S.
1400-1530	Food Inspection (L)	Chadha, D.S.
1600-1730	Regulatory Food Analysis (L)	Kapur, O.P.

1	2	3
12.1.1978 - Thursday		
0900-1700	Principles of food surveillance and Monitoring (L)	Majumder, S.K.
	Safety in Laboratory analysis	-do-
	Design of analytical laboratories	-do-
Modern Analytical Instrumentation		
13.1.1978 - Friday		
0900-1700	Principles of Modern instrumental analysis (L/D/P)	Venkatakuppiah, R.
	Analytical parameters and the analyst	Nagaraja, K.V. Bhavnagary, H.M.
	Separation techniques (liquid-sokid, liquid-liquid, gas-liquid)	Shankaranarayana, M.L. SubbaRao, D.
14 & 15.1.1978 - HOLIDAYS		
16 & 17.1.1978 - Monday & Tuesday		
0900-1700 -	Principles of modern instrumental Analysis: Determination techniques (Spectrophotometry, chromatography, Spectrometry, electrochemistry, others) (LDP)	Venkatakuppiah, R. Nagaraja, K.V. Bhavnagary, H.M. Shankaranarayana, M.L.
	Principles and techniques of minor instrument repairs (L/D/P)	Venkatakuppiah, R.
18.1.1978 - Wednesday		
	Food Legislation, Regulation and Food Standards (L)	D.S. Chadha
	Food Inspection and International Trade (L)	-do-
19.1.1978 - Thursday		
	Regulatory Food Analysis and legal action (L)	-do-
	Codex Alimentarium & Model Food Law (L)	-do-
20.1.1978 - Friday		
	Monitoring Programme General discussion on Food Contamination and Course Review	Malik, R.K. Chadha, D.S. Majumder, S.K. Manjrekar, S.P. Kapur, O.P. Sreenivasamurthy, V.
21 & 22.1.1978 - HOLIDAYS		
23 & 24.1.1978 - Monday & Tuesday		
0900-1700	Principles and techniques of minor instrument repairs (L/D/P)	Venkatakuppiah, R.
25.1.1978 - Wednesday		
0900-1700	Introduction to Laboratory management for food contaminant monitoring (L)	Majumder, S.K.
26.1.1978 - Thursday - Holiday		

1	2	3
27.1.1978 - Friday		
0900-1700	The FAO/WHO Food and Animal Feed Contamination Monitoring/ Programme (L)	Malik, R.K.
	Problem of food contamination in developing countries (L)	-do-
	General Discussion on food contamination	-do-
28 & 29.1.1978 - HOLIDAYS		

III. PESTICIDE RESIDUES IN FOOD AND MONITORING

30.1.1978 - Monday		
0900-1000	Briefing on the Programme of pesticide analysis	Majumder, S.K.
1. Pesticide Chemistry and Analysis		
1000-1300	Chemistry & Analysis of organochlorine pesticide (Group I - Venue: Residue Lab)	Visweswariah, K. Prakash, S.R. Raju, G.S.
	Carbamates (Gr. II - Venue: Fumigation Lab)	Rangaswamy, J.R. Vijayashankar, Y.N.
	Inorganic pesticides and pyrethrins (Gr. III - Venue: Nontoxic Pesticide Lab)	Bhavnagary H.M.
31.1.1978 - Tuesday		
0900-1300 1400-1700	Chemistry and analysis of organochlorine pesticides (DDT/BHC/Dieldrin) (Gr. I - Venue: Residue Lab)	Visweswariah, K. Prakash, S.R. Raju, G.S.
	Chemistry & analysis of fumigants (MB/EDB/PH_3) (Gr.II - Venue: Fumigation Lab)	Muthu, M. Rajendran, S. Krishnamurthy, T.S.
	Inorganic pesticides and pyrethrins (Group III - Venue: Nontoxic pesticide Lab)	Bhavnagary, H.M. Muktha Bai, K.
1.2.1978 - Wednesday		
0900-1300	Chemistry and analysis of phosphatic pesticides (Gr. I - Venue: Residue Lab)	Visweswariah, K.
	Chemistry and analysis of fumigants (Gr. II - Venue: Fumigation Lab)	Muthu, M. Rajendran, S. Krishnamurthy, T.S.
	Chemistry and analysis of inorganic/pesticide and pyrethrins (Gr. III - Venue: Nontoxic pesticide Lab)	Bhavnagary, H.M. Muktha Bai, S.
2.2.1978 - Thursday		
0900-1300 1400-1700	Chemistry and analysis of organochlorine (Gr. II - Venue: Residue Lab)	Visweswariah, K. Prakash, S.R. Raju, G.S.
	Chemistry & Analysis of carbamates (Gr. III - Venue: Fumigation Lab)	Rangaswamy, J.R. Vijayashankar, Y.N.
	Chemistry and analysis of inorganic/pesticide and pyrethrins (Gr. I - Venue: Nontoxic pesticide Lab)	Bhavnagary, H.M. Muktha Bai, S.

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3.2.1978 - Friday		
0900-1300 1400-1700	Chemistry and analysis of organochlorine pesticides (Gr. II - Venue: Residue Lab)	Visweswariah, K. Prakash, S.R. Raju, G.S.
	Chemistry and analysis of fumigants (Gr. III - Venue: Fumigation Lab)	Muthu, M. Krishnamurthy, T.S. Rajendran, S.
	Chemistry and analysis of inorganic and pyrethrins (Gr. I - Venue: Nontoxic Pesticide Lab)	Bhavnagary, H.M. Muktha Bai, S.
4 & 5. 2.1978 - HOLIDAYS		
6.2.1978 - Monday		
0900-1300 1400-1700	Chemistry and analysis of organophosphorus (Gr. II - Venue: Residue Lab)	Visweswariah, K. Raju, G.S.
	Chemistry and analysis of fumigants (Gr. III - Venue: Fumigation Lab)	Muthu, M. Rajendran, S. Krishnamurthy, T.S.
	Chemistry and analysis of inorganic and pyrethrins (Gr. I - Venue: Nontoxic Pesticide Lab)	Bhavnagary, H.M. Muktha Bai, S.
7.2.1978 - Tuesday		
0900-1300 1400-1700	Chemistry and analysis of organochlorine (Gr. III - Venue: Residue Lab)	Visweswariah, K. Prakash, S.R. Raju, G.S.
	Chemistry and analysis of carbamates (Gr. I - Venue: Fumigation Lab)	Rangaswamy, J.R. Vijayashnakar, Y.N.
	Chemistry and analysis of inorganic & pyrethrins (Gr. II - Venue: Nontoxic Pesticide Lab)	Bhavnagary, H.M. Muktha Bai, K.
8.2.1978 - Wednesday		
0900-1300	Chemistry and analysis of organochlorine (Gr. II - Venue: Residue Lab)	Visweswariah, K. Prakash, S.R. Raju, G.S.
	Chemistry and analysis of fumigants (Gr. I - Venue: Residue Lab)	Muthu, M. Krishnamurthy, T.S. Rajendran, S.
	Chemistry and analysis of inorganic and pyrethrins (Gr. II - Venue: Nontoxic Pesticide Lab)	Bhavnagary, H.M. Muktha Bai, S.
2. Pesticide Residue Monitoring in Foods		
10.2.1978 - Friday		
0900-1300 1400-1700	Extraction of cereals, leafy vegetables and fatty foods (Venue: Residue Lab)	Visweswariah, K. Prakash, S.R. Vijayashankar, Y.N. Raju, G.S.
11 & 12.2.1978 - Completion of laboratory Note books		

1	2	3
13.2.1978 - Monday		
0900-1300 1400-1700	Clean-up methods and concentration (Venue: Residue Lab)	Visweswariah, K. Prakash, S.R. Raju, G.S.
14.2.1978	TLC - Analysis	Visweswariah, K.
15.2.1978	GLC - Analysis	Jayaram, M.
16.2.1978	(Venue: Residue Lab)	Raju, G.S.
3. Rationale of pesticide residue analysis and monitoring		
17.2.1978 - Friday		
0900-1030	Pesticide residue problems in foods in tropical environment (L/D) (Venue: Lec. Hall I)	Majumder, S.K.
1100-1300	Toxicological assay methods (D) (Venue: Animal House and Toxicology Lab)	Krishnakumari, M.K. Muralidhara
1430-1600	Problems of monitoring of residues in samples of unknown history (L) (Venue: Lec. Hall IV)	Majumder, S.K.
18 & 19.2.1978 - HOLIDAYS		
20.2.1978 - Monday		
0900-1100	Technical films on pesticide and analytical methods (D)	
1130-1300	Discussion on Methodologies and Discussions relevant to the situations and strategies in the countries of the participants (Venue: Lec. Hall IV)	Majumder, S.K. Muthu, M. Krishnakumari, M.K. Visweswariah, K. Rangaswamy, J.R. Bhavnagary, H.M. Venugopal, J.S.
21.2.1978 - Tuesday		
0900-1700	REVIEW AND TEST (Venue: Lec. Hall IV)	Majumder, S.K.
IV. MICROBIAL CONTAMINANTS & MYCOTOXINS		
22.2.1978 - Wednesday		
0900-1000	A few examples of biological contaminants and food hygiene (L)	Sreenivasamurthy, V.
1000-1100	Undesirable commercial aspects of biological contamination (L)	Dwarakanath, C.T.
1130-1230	Toxicological effects of microbial contamination (L)	Naik, Hari Sen
1400-1700	Determination of Salmonella, Trichinella Spirales, cysticercus bovis, Echinococcus granulosus, Vibrio parahaemolyticus, Clostridium botulinum and filth	Dwarkanath, C.T. Naik, Hari Sen

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23.2.1978 - Thursday		
0900-1000	Monitoring of microbial contaminants (L)	Naik, Hari Sen
1000-1100	Elimination of biological contaminants and regulatory action for the prevention of biological contamination (L)	Sreenivasamurthy, V.
1130-1230	Food plant sanitation (L)	Dwarakanath, C.T.
1400-1700	Determination of Salmonella etc. (P)	Dwarakanath, C.T. Naik, Hari Sen
Mycotoxins in Food and Monitoring		
24.2.1978 - Friday		
0900-1000	Historical review - discovery of aflatoxin and early literature of mycotoxins (L)	Sreenivasamurthy, V.
1000-1100	Fungi: Morphology, physiology and ecology (L)	Basappa, S.C.
1130-1230	Classification of fungi with special reference to toxigenic fungi (L)	Basappa, S.C.
1400-1700	Analysis of foods for fungal contamination (P)	Basappa, S.C. Rati Rao, E. Mayura, K.
25 & 26.2.1978 - HOLIDAYS		
27.2.1978 - Monday		
0900-1000	Field and storage fungi - distribution and interrelationship between storage insects and fungi (L)	Basappa, S.C.
1000-1100	Fungi as source of metabolites - beneficial and harmful (L)	Basappa, S.C. Sreenivasamurthy, V.
1130-1230	Distribution of aflatoxin (L)	-do-
1400-1700	Analysis of foods for fungal contamination (P)	Basappa, S.C. Rati Rao, E. Mayura, K.
28.2.1978 - Tuesday		
0900-1000	Chemistry of aflatoxins (L)	Shantha, T.
1000-1100	Biosynthesis of aflatoxin (L)	Sreenivasamurthy, V.
1130-1230	Properties of aflatoxins (L)	Shantha, T.
1400-1700	Physical characteristics of aflatoxins (P)	Shantha, T. Mayura, K.
1.3.1978 - Wednesday		
0900-1000	Sampling methods (Mycotoxins) (L)	Basappa, S.C.
1000-1100	P. citrinum toxins (L)	Mayura, K.
1130-1230	Analytical methods (Mycotoxins)	Basappa, S.C.
1400-1700	Physicochemical assay method for aflatoxin in peanut and its products (BF Procedure) (P)	Basappa, S.C. Shantha, T. Srikanta, S.

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2.3.1978 - Thursday		
0900-1000	Analytical methods (L)	Basappa, S.C.
1000-1200	Observations-on analysis of foods for fungal contamination	Basappa, S.C. Mayura, K. Rati Rao, E.
1400-1700	Assay method for aflatoxin in peanut and its products (CB procedure) (P)	Basappa, S.C. Shantha, T. Srikanta, S.
3.3.1978 - Friday		
0900-1000	Analytical methods (L)	Basappa, S.C.
1000-1200	Comparison of BF and CB procedures (P)	Basappa, S.C. Shantha, T. Srikanta, S.
1400-1700	Assay of aflatoxins using Fluoro densitometer and Fluorotoxinmeter (P)	-do-
4 & 5.3.1978 - HOLIDAYS		
6.3.1978 - Monday		
0900-1130	Chemical confirmation of aflatoxin identity (P)	Basappa, S.C. Shantha, T. Srikanta, S.
1130-1230	Pesticide residue analysis (L)	Hill, K.R.
1400-1500	Bioassay techniques for aflatoxin	Shankarmurti, A.
1500-1600	Microbiological analysis of mycotoxins (L)	Basappa, S.C.
7.3.1978 - Tuesday		
0930-1230	International regulation on pesticides in foods (L/D)	Hill, K.R.
8.3.1978 - Wednesday		
0900-1130	Microbiological assay of aflatoxins (P)	Srikanta, S. Mayura, K.
1130-1300	Pesticide residue analysis by quantitative thin layer chromatography (L/D)	Hill, K.R.
1400-1700	Biological assay of aflatoxin using chick embryos/ guinea pigs/ducklings (D)	Basappa, S.C.
9.3.1978 - Thursday		
0900-1000	Histological studies on aflatoxins (L)	Paul Jayaraj, A.
1000-1100	Aflatoxin and human health - review of metabolism, epidemiological studies and present status (L)	Sreenivasamurthy, V.
1130-1230	Effect of aflatoxin on haematological system (L)	Shankarmurti, A.
1400-1500	Observations on microbiological assay of aflatoxins (P)	Srikanta, S. Mayura, K.
1500-1700	LD_{50} value demonstration (D)	Sreenivasamurthy, V.

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10.3.1978 - Friday		
0900-1000	Aflatoxin in human health (L)	Sreenivasamurthy, V.
1000-1100	Acute and chronic toxicity and predisposing factors to toxicity (L)	Tulpule, P.G.
1130-1230	Nutritional toxicological examination (L)	Singh, G.B.
1400-1700	Drying of groundnuts: Electronic sortex - physical method of separation of infected kernels (D)	Srinivasa Rao, P.N.
11.3.1978 - Saturday		
1000-1100	Nutritional toxicological examination (L)	Singh, G.B.
12.3.1978 - HOLIDAY		
13.3.1978 - Monday		
0900-1000	Prevention of mycotoxins - harvesting and drying (L)	Sreenivasamurthy, V.
1000-1100	Storage techniques - storage of oilseeds (L/D)	Majumder, S.K.
1130-1230	Control measures - fumigation (L)	-do-
1400-1500	-do-	-do-
1500-1700	Preventive measures - treatment of wet groundnut pods by fumigation (D)	Muthu, M.
14.3.1978 - Tuesday		
0900-1000	Removal of aflatoxin solvent extraction (L)	Sreenivasamurthy, V.
1000-1100	Detoxification of aflatoxin by physical means (L)	Shantha, T.
1130-1230	Detoxification of aflatoxin - biological - present status and future possibilities (L)	Srikanta, S.
1400-1700	Removal/destruction of aflatoxin by physical means (D)	Basappa, S.C. Shantha, T.
15.3.1978 - Wednesday		
0900-1000	Organization for National Monitoring Programme for Aflatoxin in Food (L)	Sreenivasamurthy, V.
1000-1100	Detoxification of aflatoxin by chemical means (L)	Shantha, T.
1400-1700	Detoxification of aflatoxin- laboratory and pilot plant scale techniques (D)	Basappa, S.C. Srikanta, S.
16.3.1978 - Thursday		
0900-1000	Ochratoxins - occurence, chemistry and methods of analysis (L)	Rati Rao, E.
1000-1100	Toxicology of ochratoxins (L)	Rati Rao, E.
1130-1230	Metabolism of ochratoxins (L)	Basappa, S.C.
1400-1700	Analysis of ochratoxin A (P)	Basappa, S.C.

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17.3.1978 - Friday		
0900-1230	Group Discussion	
1400-1700	Mass Spectrometer	
18 & 19.3.1978 - HOLIDAYS		
	V. METALLIC CONTAMINANTS	
20.3.1978 - Monday		
0900-1700	Sources of environmental pollution - Distribution of lead (L)	Nagaraja, K.V.
	Pathological effects of major contaminated food items (L)	-do-
	Methods of determination of lead in foods (L)	-do-
21 to 23.3.1978 - Tuesday to Thursday		
0900-1700	Destruction of organic matter and preparation of standard solutions for the determination of lead in foods (P)	Nagaraja, K.V. Eipeson, W.E. Vibhakar, S. Manjunath, M.N. Narayana, K. Bhavnagary, H.M.
	Determination of lead in canned fruit juice by AAS method (P)	
	Determination of lead in canned juice vegetables by colorimetric dithizone method (P)	-do-
	Determination of lead in canned fruit juice by polarographic method (P)	-do-
24, 25 & 26.3.1978 - HOLIDAYS		
27.3.1978 - Monday		
0900-1700	Sources of environmental pollution - distribution of cadmium (L)	Nagaraja, K.V.
	Pathological effects and major food items contaminated (L)	-do-
	Methods of determination of cadmium in foods (L)	-do-
28 to 31.3.1978 - Tuesday to Friday		
0900-1700	Determination of cadmium in ceramic containers by AAS methods (P)	Nagaraja, K.V. Eipeson, W.E. Vibhakar, S. Narayana, K. Manjunath, M.N. Bhavnagary, H.M.
	Determination of cadmium in canned juice vegetables by colorimetric dithizone method (P)	
1 & 2.4.1978 - HOLIDAYS		
3.4.1978 - Monday		
0900-1700	Sources of environmental pollution-distribution and transformation of mercury (L)	Nagaraja, K.V.
	Pathological effect, target organs and food items contaminated (L)	-do-

1	2	3
3.4.1978 - Monday		
0900-1700	Methods of determination of total mercury in foods: (a) sampling, (b) determination of mercury by chromatographic method, (c) determination of mercury by colorimetric dithizone method (L)	-do-
4.4.1978 - Tuesday		
0900-1130	Overview of Metals programme at the USFDA - Analysis by Polarography for Pb and Cd (L)	Suddendorf, R.F.
1130-1700	Destruction of organic matter and preparation of standard solutions for the determination of mercury (P)	Nagaraja, K.V. Eipeson, W.E. Vibhakar, S. Narayana, K. Manjunath, M.N. Bhavnagary, H.M.
5.4.1978 - Wednesday		
0900-1130	Metals analysis by Atomic Absorption including Hybrid Generation for As, Se & Sb. - Mercury and methyl mercury methodology. (P)	Suddendorf, R.F.
1130-1700	Determination of mercury in fish by flameless AAS method (P)	Nagaraja, K.V. Eipeson, W.E. Vibhakar, S. Narayana, K. Manjunath, M.N. Bhavnagary, H.M.
6.4.1978 - Thursday		
0900-1130	Neutron activation Analysis (L)	Suddendorf, R.F.
1130-1700	Determination of mercury in fish by colorimetric dithizone method (P)	Nagaraja, K.V. Eipeson, W.E. Vibhakar, S. Narayana, K. Manjunath, M.N. Bhavnagary, H.M.
7.4.1978 - Friday		
0900-1700	Determination of copper/zinc in foods by AAS method (L)	Nagaraja, K.V.
	Determination of copper/zinc in foods by colorimetric method (L)	-do-
	Determination of copper/zinc in foods by AAS method (P)	Nagaraja, K.V.
	Determination of copper/zinx in foods by colorimetric method (P)	Vibhakar, S. Narayana, K. Manjunath, M.N.
	Determination of tin in foods by volumetric method (P)	-do-

LIST OF EXTERNAL LECTURERS

The course was fortunate in having the benefit of experience of several guest lecturers in addition to the Faculty members drawn from CFTRI Scientists:

	External Lecturers		Topics
1.	Dr. R.K. Malik, Acting Chief Food Policy and Nutrition Division, FAO of the UN Rome, Italy	i) ii)	Objective of FCA Course International programmes
2.	Mr. J.R. Lupien, Officer in charge, Food Standards and Food Science Service, FAO of the UN, Rome, Italy		FAO Programmes Codex
3.	Dr. Ida A. Leone Dept. of Plant Pathology Cook College, Rutgers State University New Jersey 08903 USA		Pesticide pollution and its effect on biosphere and plant tissues
4.	Mr. D.S. Chadha, Asst. Director General (PFA) Directorate General of Health Services New Delhi 110 001	i) ii)	Food Regulations Analytical set up in India
5.	Dr. P.G. Tulpule Dpy. Director, National Institute of Nutrition Taranaka, Hyderabad 9		Chronic and acute toxicity of mycotoxins
6.	Dr. G.B. Singh Industrial Toxicology Research Centre Lucknow		Mycotoxins - Nutritional toxicological examination
7.	Dr. K.R. Hill, Chief, Analytical Chemistry Laboratory, Beltsville - Agricultural Research Centre Beltsville, Maryland 20705, U.S.A.	i) ii) iii)	Pesticide residues International regulation on pesticides in foods Pesticide residue quantitative analysis
8.	Dr. Ronald F. Suddendorf Research Chemist, FDA, Washington 20204, U.S.A.		Heavy metal analysis
9.	Dr. A. Slorach, Associate Professor, Toxicology Laboratory, National Food Administration, Uppsala, Sweden	i) ii)	Toxicological protocol National monitoring programme

FIELD VISITS

The Field Visits were organized with the help of the Directorate of Health Services and Food Inspection Agencies. The objectives of the field visits were to offer the facilities for observation on the regulatory analysis in vogue in the host country and to gather information on variety of problems which Food Contaminant Analysts would have to face under diverse agricultural and climatic situations. Discussion on the regulatory analysis and monitoring programmes with the Analysis of the government laboratories were held. The following were the programmes of the field visits:

FIELD TRIP I - COCHIN - 15-19th MARCH 1978

15.3.1978	(AN)	Lv. Mysore (by Institute's tranport) Ar. Bandipur (night halt)
16.3.1978		Lv. Bandipur Cochin
17.3.1978		Visit i) Central Institute of Fisheries Technology ii) Export Inspection Agency
19.3.1978		Lv. Cochin Ar. Mysore

Accompanying staff member from CFTRI: Dr. S.C. Basappa

FIELD TRIP II - HYDERABAD, CALCUTTA, DELHI, LUDHIANA, CHANDIGARH, KARNAL, NAGPUR, BOMBAY, POONA - 9th APRIL-10th MAY 1978

9.4.78	-	Bangalore-Hyderabad	Visit Central Plant Protection Training Institute and National Institute of Nutrition
10-13.4.78	-	Hyderabad (4 days)	
13.4.78	-	Hyderabad-Calcutta	
14-19.4.78	-	Calcutta (5 days)	Visit Central Food Laboratory
19.4.78	-	Calcutta-Delhi	
20-27.4.78	-	Delhi-Ludhiana-Chandigarh-Karnal (6 days)	Visit IARI, Punjab, Agri. University, Public Health Laboratory
28.4.78	-	Delhi-Nagpur	
28-29.4.78	-	Nagpur (2 days)	Visit Agmark Lab. and National Environmental Engineering Res. Institute
29.4.78	-	Nagpur-Bombay	

30.4.78 9.5.78	- Bombay-Poona-Bombay (8 days)	Visit FDA & BARC, Public Health Institute, National Chemical Laboratory, Poona.
10.5.78	- Bombay-Bangalore-Mysore	
11-13.5.78	- Preparation of Reports	

Participants were accompanied by:

- Dr. S.P. Manjrekar
- Mr. K.V. Nagaraja
- Mr. R. Rodriquez
- Dr. K. Visweswariah
- Mr. A.K. Shivastav

WORKSHOP

On conclusion of the field visits, a Workshop was held at CFTRI, Mysore with the following programme:

WORKSHOP ON FOOD CONTAMINANTS MONITORING & CONTROL

Workshop Director: Majumder, S.K.

May 15, 1978 to May 20, 1978

SESSION I

May 15, 1978 - Monday - 0930 Hrs

Welcome and Introductory remarks	- Director, CFTRI
Keynote address	- Dr. I.D. Bajaj Asst. Director-General of Health Services, Govt. of India
General remarks on the objectives	- Lupien, J.
Review of the progress on the First FCA Course	- Majumder, S.K.

SESSION II - 1430 Hrs - Chairman: Lupien, J.
Rapporteur: Nagaraja, K.V.

Food Control - An integrated approach	- Lupien, J.
Monitoring - Concept and mode of setting up monitoring system	- Slorach, A.

SESSION III - 0930 Hrs - Tuesday - May 16, 1978

How to prepare programmes and projects for national action	- Lupien, J. - Slorach, A.

SESSION IV - 1430 Hrs - Chairman: Slorach, A.
Rapporteur: Bhavnagari, H.M.

Country Status reports:

a) Mexico
b) Cuba
c) Bangladesh
d) Fiji

May 17, 1978 - Wednesday - 0930 Hrs

Status reports (contd)

e) Zambia
f) Syria
g) Nepal
h) Thailand

May 18, 1978 - Thursday - 0930 Hrs

Status report (contd)

i) Jamaica
j) Ghana
k) Philippines
l) India

SESSION V - 1430 Hrs - Chairman: Chadha, D.S.
Rapporteur: Visweswariah, K.

Presentation of Projects or programmes for follow up:

Mexico	Zambia	Jamaica
Cuba	Syria	Ghana
Bangladesh	Nepal	Philippines
Fiji	Thailand	India

Discussion on country reports

SESSION VI - Friday - May 19, 1978 - 0930 Hrs

Chairman: Majumder, S.K.
Rapporteur: Ranganna, S.

Discussion on Course Contents:

Background and preparatory phase	- Manjrekar, S.P. - Ranganna, S.
Pesticide residue analysis and monitoring	- Majumder, S.K. - Visweswariah, K.
Metal contaminants	- Kapur, O.P. - Nagaraja, K.V.
Microbial & mycotoxins	- Sreenivasamurthy, V. - Basappa, S.C.
Field visits/Training in Field Laboratories	- Chadha, D.S.

SESSION VII - Saturday - May 20, 1978 - 0930 Hrs

Valedictory Function - Welcome	- Amla, B.L. Director, CFTRI
Report & instrospection on the FCA course	- Majumder, S.K. Course Coordinator
Distribution of Certificates of Completion and Valedictory address	- Chief Guest - Dr. D.V. Urs, Vice-Chancellor, Univ. of Mysore

	Comments	- Lupien & Slorach
	Vote of Thanks	- Manjrekar, S.P.
1230-1430	Lunch with Faculty Members	
	Depart to Home countries	

DOCUMENTATION FOR THE FCA COURSE

A) BOOKS

The following books were recommended and most of these were provided to the participants in addition to the course lecture notes:

1. Chemistry of Food by Meyer
2. Food Microbiology by Fraser
3. Instrumental Methods of Analysis by Willard
4. Chemistry of Pesticides by Melnikov
5. A.O.A.C. Official Methods of Analysis
6. Pesticides by Majumder
7. Fumigation & Gaseous Pasteurisation by Majumder and Venugopal
8. FAO/WHO Publications: Guidelines for developing an Effective National Food Control System
9. FAO/UNEP Guidelines for Establishing or Strengthening National Food Contamination Monitoring Programmes.

Apart from books, cyclostyled manuals on mycotoxins, pesticide and heavy metal contamination analysis from CFTRI, were made available to the participants.

B) TECHNICAL FILMS

The following technical films were screened for the benefit of the participants:

1. The Mass Spectrometer
2. Electro Chemistry
3. Analysis of solids with MS 7 Spectrometer
4. Poisons, Pests and People

SYMPOSIUM ON FOOD CONTAMINANTS

A one day Symposium was held on "Food Contaminants" at CFTRI for the benefit of the participants. Prof. Ida A. Leone, Department of Plant Biology, Cook College, Rutgers University New Jersey 08903, U.S.A. was invited to give a special lecture on the "Effect of air pollution on vegetation". The Symposium Programme was as follows:

ONE DAY SYMPOSIUM ON "FOOD CONTAMINANTS"

December 14, 1977

Programme

SESSION I - Introductory - Chairman: B.L. Amla

Genesis and Scope of the Food Contaminants Symposium	- Majumder, S.K.
Effect of Airpollution on vegetation	- Leone, Ida
Vote of Thanks	- Patwardhan, M.V.

SESSION II - Chemistry, Occurrence & Methods of Estimation

Chairman: Rama Rao, P.B.

Occurrence, chemistry and problems of estimation of mycotoxins	- Basappa, S.C.
Occurrence and methods of estimation of pesticides in food materials	- Visweswariah, K.

SESSION III - Metabolism

Chairman: Raghavendra Rao, M.R.

Metabolism of some microbial toxins and its health significance	- Sreenivasamurthy, V.
Metabolism of Pesticides	- Radhakrishnamurthy, R.

SESSION IV - Permissible limits, Toxicity and Safety Regulations

Chairman: Parihar, B.D.

Mycotoxins	- Sreenivasamurthy, V.
Permissible limits, toxicity and safety regulations in relation to pesticides	- Krishnakumari, M.K.

SESSION V - Short Research Communications on Food Contaminants

Chairman: Ramaiah, T.

A new procedure for the estimation of organotin stabilizers in plastic containers	- Vasundara, T.S. - Parihar, B.D.
Safety of the use of sorbic acid in the preservation of chappatis	- Satyanarayana Rao, T.S. - Chandrakutty - Ramakrishna, M.V.

SESSION VI - Concluding Remarks on Food Contaminants - Majumder, S.K.

Vote of Thanks - Raina, P.L.

ANNEX IV

SECOND FCA COURSE

Mysore (India), 18 September 1978 - 17 March 1979

(Time table, List of external lecturers, Field visits, Workshop)

TIME TABLE

Date	Time	Subject	Faculty
1.	ORIENTATION		
18.9.78	0900-1000	Registration	Training Centre Office
	1030-1300	Visit to the Institute	Nair, V.S.
	1430-1530	Discussion with participants	Majumder, S.K. Sreenivasamurthy, V. Kapur, O.P. Manjrekar, S.P.
	1600	Inauguration	Amla, B.L./Kouthon, G.D.
19.9.78	0900-1100	Orientation to the Course	Kouthon, G.D.
	1130-1230	Microbial contaminants and mycotoxins	Sreenivasamurthy, V.
	1430-1530	Foreign chemicals in foods	Majumder, S.K.
	1600-1700	Metal contaminants in foods	Kapur, O.P.
2.	INTRODUCTORY & BASIC FOOD SCIENCE		
20.9.78	0900-1030	Proximate composition of foods (L)	Manjrekar, S.P.
	1100-1230	Intrinsic toxic factors in foods (L)	Subramanian, N.
	1400-1700	Estimation of moisture in foods(P)	Sakariah, K.K. Krishnamurthy, M.N.
21.9.78	0900-1030	Carbohydrates - Chemistry of sugars (L)	Sakariah, K.K.
	1100-1230	Carbohydrates - Chemistry of polysaccharides (L)	Sakariah, K.K.

Date	Time	Subject	Faculty
21.9.78	1400-1700	Estimation of sugars in foods (P)	Sakariah, K.K. Krishnamurthy, M.N.
22.9.78	0900-1030	Fats - Chemistry & distribution in foods (L)	-do-
	1100-1230	Fats - Quality parameters (L)	-do-
	1400-1700	Determination of rancidity in fats (P)	-do-
25.9.78	0900-1030	Chemistry of amino-acids (L)	Sakariah, K.K.
	1100-1230	Proteins - Structure and functional properties (L)	-do-
	1400-1700	Estimation of proteins in foods (P)	Sakariah, K.K. Vijaya, H.R.
26.9.78	0900-1030	Vitamins - fat-soluble vitamins (L)	Sakariah, K.K.
	1100-1230	Vitamins - water soluble vitamins (L)	-do-
	1400-1700	Estimation of β-carotene/Vitamin B_2 in foods	Sakariah, K.K. Vijaya, H.R.
27.9.78	0900-1030	Food quality - colour, texture and flavour (L)	Lakshminarayana Setty
	1100-1230	Food quality in relation to processing (L)	Manjrekar, S.P.
	1400-1700	Sensory evaluation (L&D)	Govindarajan, V.S. Raghuveer, K.G.
28.9.78	0900-1030	Microorganisms and food spoilage (L)	Manjrekar, S.P.
	1100-1230	Principles of food preservation (L)	-do-
	1400-1700	Bacteria, yeasts and mould counts in foods (P)	Vaseema Rahim Yajurvedi, R.P.
29.9.78	0900-1030) 1100-1230)	Statistics in the control of environmental contaminants in food methods (L)	Shihari, B.R.
	1400-1700	Illustrations and computational techniques (L & P)	Ramesh, B.S.

Date	Time	Subject	Faculty
30.9.78	0900-1030) 1100-1230)	Statistical sampling methods and applications (L)	Srihari, B.R.
	1400-1700	Illustrations and computational techniques **(L & P)**	Ramesh, B.S.
3.10.78	0900-1030 1100-1230	Statistical quality control - Methods and application (L)	Srihari, B.R.
	1400-1700	Illustrations and computational techniques **(P)**	Ramesh, B.S.
4.10.78	0900-1030) 1100-1230)	Paper chromatography and TLC (L&P)	Rajagopala Rao, D. Kannan, G.
	1400-1700	GLC and GC/MS L&P	Ravindranath, B. Muthu, M. Venkatakuppaiah, R. Visweswariah, K.
5.10.78	0900-1030) 1100-1230)	Gel Electrophoresis - theory & application **(L & P)**	Narasinga Rao, M.S.
	1400-1700	Polarography (L&P)	Balasubramanyam, N. Subba Rao, D. Nagaraja, K.V. Venkatakuppaiah, R.
6.10.78	0900-1030) 1100-1230)	UV, IR **(L & P)**	Shankaranarayana, M.L. Venkatakuppaiah, R.
	1400-1700	A A Spectrophotometry (L&P)	Nagaraja, K.V.
7.10.78	1000-1300	Discussion	Manjrekar, S.P.
3 (a) - MICROBIAL AND OTHER BIOLOGICAL CONTAMINANTS IN FOOD & MONITORING			
9.10.78	0900-1030	Food Microbiology - Spoilage aspects (L)	Dwarakanath, C.T.
	1100-1230	Food Microbiology - Public health aspects (L)	-do-
	1400-1700	Enumeration of Staphylococci, *Bacillus cereus* and *Salmonella* (D)	Jaleel, S.A. Premalatha, K. Vijayalakshmi, G.
10.10.78) 11.10.78)		Holidays	

Date	Time	Subject	Faculty
12.10.78	0900-1030	Bacterial toxins (L)	Dwarakanath, C.T.
	1100-1230	Bacterial toxins (L) - continued	-do-
	1400-1700	Escherichia coli test (P)	Nagaraja Rao, K.S. Vijayalakshmi, G. Premalatha, K.
13.10.78	0900-1030	Metabolism of bacterial toxins (L)	Sreenivasamurthy, V.
	1100-1230	Metabolism of bacterial toxins (L) - continued	-do-
	1430-1530	Introduction to Mycology (L)	Nagaraja Rao, R.S.
	1600-1700	Ecology covering field and storage fungi (L)	-do-
14.10.78) 15.10.78)		Holidays	
3 (b) - MYCOTOXINS IN FOOD AND MONITORING			
16.10.78	0900-1000	Historical review on mycotoxins (L)	Sreenivasamurthy, V.
	1000-1100	Occurrence and distribution of mycotoxins (L)	Basappa, S.C.
	1400-1700	Physical characteristics of aflatoxins (P)	Shantha, T. Mayura, K.
17.10.78	0900-1000	Fungi as source of useful and harmful metabolites (L)	Sreenivasamurthy, V.
	1000-1100	Chemistry of aflatoxins (L)	Shantha, T.
	1400-1700	Physicochemical assay method for aflatoxin in peanuts (B F Procedure) (P)	Basappa, S.C. Srikanta, S. Shankar Murti, A.
18.10.78	0900-1000	Properties of aflatoxins (L)	Shantha, T.
	1000-1100	Sampling methods (L)	Basappa, S.C.
	1400-1700	Analysis of aflatoxin in peanut butter by B F Procedure (P)	Srikanta, S. Shankar Murti, A. Basappa, S.C.
19.10.78	0900-1000	Analytical methods (L)	Basappa, S.C.

Date	Time	Subject	Faculty
19.10.78	1100-1200	Analytical Methods (L)	Basappa, S.C.
	1400-1700	Analysis of aflatoxin in corn by B.F. Procedure (P)	Shantha, T. Srikanta, S. Basappa, S.C.
20.10.78	0900-1200	Determination of aflatoxin in peanuts by Pons' Method (P)	Basappa, S.C. Srikanta, S. Mayura, K.
	1400-1700	Determination of aflatoxin in vegetable oils by Pons' Method (P)	Shantha, T. Basappa, S.C. Mayura, K.
21.10.78) 22.10.78)		Holidays	
23.10.78	0900-1000	Analytical methods (L)	Basappa, S.C.
	1000-1100	Bioassay techniques for aflatoxin (L)	Shankar Murti, A.
	1400-1700	Determination of aflatoxin in corn by Pons' Method (P)	Mayura, K. Srikanta, S. Basappa, S.C.
24.10.78	0900-1200	Screening method for aflatoxin in corn by minicolumn procedure (D)	Basappa, S.C. Shantha, T. Srikanta, S.
	1400-1700	Estimation of aflatoxin in cottonseed by Pons' Method (P)	Srikanta, S. Shankar Murti, A. Mayura, K.
25.10.78	0900-1000	Analytical methods (L)	Basappa, S.C.
	1000-1100	Histological studies on aflatoxins (L)	Paul Jayaraj, A.
	1400-1700	Analysis of aflatoxin in peanuts by Dialysis Method (D)	Basappa, S.C. Mayura, K.
26.10.78	0900-1200	Estimation of aflatoxin M in milk (P)	Mayura, K. Shantha, T. Basappa, S.C.
	1400-1700	Methods of estimation - "Comparison of Standard" and "Dilution to Extinction" procedures (D)	Srikanta, S. Mayura, K. Basappa, S.C.

Date	Time	Subject	Faculty
27.10.78	0900-1200	Assay method for aflatoxin in peanut and its products - C B Procedure (P)	Shantha, T. Mayura, K.
	1400-1700	Chemical confirmation of aflatoxin B_1 identity (P)	Basappa, S.C. Mayura, K.
28.10.78) 29.10.78)		Holidays	
30.10.78	0900-1000	Microbiological analysis of mycotoxins (L)	Basappa, S.C.
	1000-1100	Effect of aflatoxin on haematological system (L)	Shankar Murti, A.
	1400-1700	Assay of aflatoxins using Spectrodensitometer and Fluorotoxinmeter (D)	Shantha, T. Shankar Murti, A. Basappa, S.C.
31.10.78		Holiday	
1.11.78	0900-1200	Microbiological assay of aflatoxin B_1(P)	Srikanta, S. Mayura, K.
	1400-1700	LD_{50} value demonstration using guinea pigs (D)	Shankar Murti, A. Basappa, S.C. Srikanta, S.
2.11.78	0900-1200	Chick embryo test (D)	Basappa, S.C. Shankar Murti, A.
	1200-1300	Observations on microbiological assay	Srikanta, S. Mayura, K.
	1400-1700	Distinguishing test for aflatoxin (D)	Shantha, T. Shankar Murti, A.
3.11.78	0900-1000	Prevention of mycotoxins by harvesting and drying methods (L)	Sreenivasamurthy, V.
	1000-1100	Acute and chronic toxicity & predisposing factors (L)	Tulpule, P.G.
	1400-1700	Drying of groundnuts; electronic sortex for separation of infected kernels (D)	Basappa, S.C. Srikanta, S.
4.11.78) 5.11.78)		Holidays	

Date	Time	Subject	Faculty
6.11.78	0900-1000	Nutritional toxicological examination (L)	Singh, G.B.
	1030-1130	Aflatoxin and human health (L)	Sreenivasamurthy, V.
	1400-1700	Preparation of standards of aflatoxins (D)	Shantha, T. Srikanta, S. Mayura, K.
7.11.78	0900-1000	Removal/destruction of mycotoxins by physical means (L)	Shantha, T.
	1030-1130	Aflatoxin and human health (L)	Sreenivasamurthy, V.
	1400-1700	Removal/destruction of aflatoxin by filtration-cum-adsorption and photolysis (D)	Basappa, S.C. Shantha, T.
8.11.78	0900-1000	Detoxification of mycotoxins by chemical means (L)	Srikanta, S.
	1000-1100	Organization for national monitoring programme for aflatoxin in food (L)	Sreenivasamurthy, V.
	1400-1700	Detoxification of aflatoxin - laboratory and pilot plant scale techniques (D)	Srikanta, S. Basappa, S.C. Shankar Murti, A.
9.11.78	0900-1000	Occurrence, chemistry, toxicology and methods of analysis of ochratoxins (L)	Shantha, T.
	1000-1100	Production of aflatoxins (L)	Basappa, S.C.
	1400-1700	Analysis of Ochratoxin A(P)	Basappa, S.C. Mayura, K.
10.11.78	0900-1000	Mycotoxins as carcinogens and mutagens (L)	Sreenivasamurthy, V.
	1000-1100	Occurrence, chemistry, toxicology and methods of analysis of Zearalenone (L)	Basappa, S.C.
	1400-1700	Analysis of Zearalenone (P)	Basappa, S.C. Shantha, T. Shankar Murti, A.
11.11.78	0900-1300	GROUP DISCUSSION & TEST	

Date	Subject		Faculty
4.	PESTICIDE RESIDUES IN FOOD AND MONITORING		
13.11.78	Organochlorine Pesticides	L D P	Visweswariah, K.
	Organophosphate Pesticides	L D P	-do-
	Carbamates	L D P	-do-
	Plant Insecticides	L D P	Ahmed, S.M. Visweswariah, K.
	Inorganic Pesticides	L D	Bhavnagary, H.M.
14.11.78	Holiday		
15.11.78	Rodenticides	L D P	Bhavnagary, H.M. Muktha Bai, K.
	Fumigants	L D P	Muthu, M. Rangaswamy, J.R.
	DDT & BHC chemistry/Separation of DDT - breakdown products on TLC/ Detection and semi-quantitative estimation/Terminal Residues	L D P	Visweswariah, K.
	Pesticide Toxicology	L	Krishnakumari, M.K.
16.11.78	Pesticide vs. Nutrition	L	-do-
	Acute toxicity and chronic toxicity LD_{50} determination	L D	-do-
	Carcinogenic, mutegnicity, Teratogenicity	L D	Paul Jayaraj Krishnakumari, M.K.
	Inhalation toxicity, LD_{50} value	L D	Muthu, M. Krishnakumari, M.K.
17.11.78	Laboratory sampling of food for pesticide analysis	L D P	Visweswariah, K.
	Principles of Residue analysis	L P	-do-
	Separation of malathion, paration, fenitrothion, DDVP on TLC and Detection		-do-
18.11.78) 19.11.78)	Holidays		
20.11.78	Methods of extraction and clean-up (Films)	D P	Visweswariah, K.

Date	Subject		Faculty
21.11.78	Analytical microscopy for fragments of pesticides	P	Ahmed, S.M.
	Threshold concentration and Analysis	D P	Muthu, M.
22.11.78	The Insecticide Act	L	Krishnakumari, M.K.
	No effect level, registration, protocol EPA/Codex/CCFS	Gl. Disc.	-do-
23.11.78	Pesticide detoxification and decontamination	D P	Visweswariah, K.
24.11.78	Laboratory Design	D P	Visweswariah, K.
	Listing equipment Specifications for pesticide residue analysis	D P	Venkatakuppaiah, R.

Lectures by Dr. K.R. Hill

16.1.79	Lecture I -	Set up in FAO/WHO to establish tolerances for pesticide residues in food. EPA/Codex/USDA etc.
17.1.79	Lecture II -	Application of reflectance densitometry as a tool for the qualitative and quantitative evaluation of pesticides on TLC
18.1.79	Lecture III -	Utility of GLC and HPLC in the analysis of pesticides

Date	Code for staff and batches				Subject of lectures and practicals 0900-1230 and 1400-1700 Hrs
	KV	*	MM	BR	
27.11.78	A	B	C	D	KV - TLC Analysis of pesticides
28.11.78	B	A	D	C	* - Library Reference
29.11.78	C	D	A	B	MM - Fumigant residue analysis
30.11.78	D	C	B	A	BR - UV Analysis of residues

Date	Code for staff and batches				Subject of lectures and practicals 0900-1230 and 1400-1700 Hrs
	KV	*	JRR	JSV	
1.12.78	A	C	B	D	JRR - Fumigant residues
2.12.78	B	D	A	C	JSV - DTA, TG, X-ray analysis of inorganic pesticides
3.12.78	Holiday				
4.12.78	MLS - All batches				KV - GLC analysis of pesticides UV IR Analysis of pesticides
5.12.78	MLS - All batches				UV IR Analysis of pesticides
6.12.78	JRR - F/N - C				Fumigant residues
	A/N - D				-do-
	JSV - F/N - A				DTA, TG, X-ray Analysis of pesticides
	A/N - B				-do-
7.12.78	KV - C & D				Colorimetry & GLC of pesticides
	SMA - A & B				Bioassay methods
8.12.78	KV - A & B				GLC of pesticides & colorimetry
	SMA - C & D				Bioassay methods
9.12.78	HMB - All batches KMB				Inorganic pesticide residues

Faculty

KV	-	Dr. K. Visweswariah
MLS	-	Dr. M.L. Shankaranarayana
SMA	-	Dr. Syed Mohammed Ahmed
BR	-	Dr. B. Ravindranath
JSV	-	Mr. J.S. Venucopal
MM	-	Mr. M. Muthu
JRR	-	Dr. J.R. Rangaswamy
HMB	-	Dr. H.M. Bhavnagary
KMB	-	Ms. K. Muktha Bai

Batch "A" - Mr. Mebrahtu Ogbai
Ms. Noor Rehan binte Abdullah
Ms. Bhugwatparsad Jhamna
Mr. Mohammed Ahmed Tomeh

Batch "B" - Mr. Claudio Ricardo Villegas Ferrari
Ms. Protima Sengupta
Ms. Urmila Joshi
Mr. Nelson Barnabas Toreu

Batch "C" - Mr. Vicente Hidalgo Hernandez
Mr. Arciniega L. Carlos
Ms. Aida Herreria Balagot
Ms. Dipti Pabari

Batch "D" - Ms. Doroty Atabong
Mr. Glaston Mwangi Kenji
Mr. Jacob O. Samba
Mr. Mutwakil Mohamed Ahmed

Date	Subject	Faculty
	5. METALLIC CONTAMINANTS IN FOODS	
11.12.78	Sources of Environmental pollution and Distribution of Lead (L)	Nagaraja, K.V./ Kapur, O.P.
	Pathological effects and major food items contaminated (L)	-do-
	Methods of determination of lead in foods (L)	-do-
12.12.78	Holiday	
13.12.78 to 15.12.78	Destruction of organic matter and preparation of standard solutions for the determination of lead in foods (P)	Manjunath, M.N./ Narayana, K.
	Determination of lead in canned fruit juice/vegetables/ turmeric by AAS method(P)	Nagaraja, K.V. Bhavnagary, H.M.
	Determination of lead in canned juice/vegetables/turmeric by colorimetric dithizone method (P)	Eipeson, W.E. Vibhakar, S.
	Determination of lead in canned juice/vegetables/turmeric by polarographic method (P)	Nagaraja, K.V. Eipeson, W.E.
16.12.78 } 17.12.78 }	Holidays	
18.12.78	Sources of environmental pollution and distribution of Cadmium (L)	Nagaraja, K.V. Kapur, O.P.
	Pathological effects and major food items contaminated (L)	-do-
	Methods of determination of Cadmium in foods (L)	-do-
19.12.78 to 22.12.78	Destruction of organic matter and preparation of standard solutions for the determination of cadmium in foods (P)	Narayana, K. Manjunath, M.N.

Date	Subject	Faculty
19.12.78 to 22.12.78	Determination of cadmium in ceramic containers by AAS method (P)	Bhavnagary, H.M. Nagaraja, K.V.
	Determination of cadmium in cereals and cereal products/canned fish by colorimetric dithizone method (P)	Eipeson, W.E. Vibhakar, S.
	Determination of cadmium in cereals and cereal products/canned fish by polarographic method (P)	Nagaraja, K.V. Eipeson, W.E.
23.12.78 to 25.12.78	Holidays	
26.12.78	Sources of environmental pollution distribution and transformation of Mercury (L)	Kapur, O.P. Nagaraja, K.V.
	Pathological effect, target organs and food items contaminated (L)	-do-
	Methods of determination of total mercury in foods (L)	-do-
27.12.78 to 29.12.78	Destruction of organic matter and preparation of standard solutions for the determination of mercury (P)	Nagaraja, K.V. Eipeson, W.E.
	Determination of mercury in canned fish/fresh water fish/Treated seed grains by flameless AAS method (P)	Nagaraja, K.V. Bhavnagary, H.M.
	Determination of mercury in canned fish/fresh water fish/Treated seed grains by colorimetric dithizone method (P)	Vibhakar, S. Narayana, K. Manjunath, M.N.
30.12.78 & 31.12.78	Holidays	
1.1.79	Determination of copper in pickles by AAS and colorimetric method (L&P)	Nagaraja, K.V. Rama Rao Narayanaswamy Prahalada Rao, K.R. Subbarao, K.R.
2.1.79 & 3.1.79	Determination of zinc in canned fruits/vegetables by AAS and colorimetric method (L&P)	Nagaraja, K.V. Narayana, K. Vibhakar, S. Manjunath, M.N. Subbarao , K.R.
4.1.79	Determination of tin in canned fruit juice/vegetables by volumetric and AAS methods (L&P)	Nagaraja, K.V. Saroja, S. Prahlada Rao, K.R. Bhavnagary, H.M. Manjunath, M.N. Narayana, K.
5.1.79	Group discussion	

EXTERNAL LECTURERS

The Second FCA course had the benefit of the following external lecturers, guest lecturers and FAO experts in addition to the faculty members drawn from the CFTRI.

1.	Dr. G.D. Kouthon, FAO	Orientation to Course
2.	Dr. G.B. Singh, ITRL, Lucknow	Mycotoxin
3.	Dr. P.G. Tulpule NIN, Hyderabad	Mycotoxin
4.	Mr. D.S. Chadha DGHS, New Delhi	Food Legislation and Control
5.	Dr. K.R. Hill USA	Pesticide residues
6.	Mr. John W. Jones FDA, USA	Heavy Metals
7.	Mr. R.K. Malik FAO	FAO/UNEP Activities
8.	Dr. P.H. Berben Netherlands	Food Control & Safety
9.	Dr. (Ms) Betty Hobbs UK	Microbiology
10.	Mr. W. Theis, FAO	Regional Food Control
11.	Mr. D. Blink, FAO	Evaluation Methods

FIELD VISITS

Second Food Contaminants Analysis Training Course

Coimbatore-Cochin-Bangalore

(7th - 13th Jan. 1979)

7.1.79 Sunday	FN AN	Lv Ar	Mysore (By Institute Transport) Coimbatore (Via Ooty)	
8.1.79 Monday	FN		Visit Rangavilas Oil Mills	Stay at HOTEL GURU Raja Street Coimbatore (Tel. 30341)
9.1.79 Tuesday	FN	Lv Ar	Coimbatore (by Air) Cochin	
	AN		Visit Export Inspection Agency	Stay at INTERNATIONAL HOTEL, M.G. Rd. Ernakulam (Te. 33911)
10.1.79 Wednesday	FN		Visit Central Institute of Fisheries Tech.	
11.1.79 Thursday	FN	Lv Ar	Cochin (by Air) Bangalore	
	AN		Visit Public Health Institute	Stay at HOTEL BANGALORE INTERNATIONAL High Grounds Bangalore (Tel. 28181)
12.1.79 Friday	FN		Visit Bangalore Dairy	
	AN		Free	
13.1.79 Saturday	FN	Lv Ar	Bangalore (By Train) Mysore	

(18.2.1979 to 10.3.1979)

18.2.79	FN	Lv	Mysore (By Institute Transport)	
		Ar	Bangalore	
		Lv	Bangalore (By IC 512; 1045 hrs)	Stay at HOTEL PARKLANE 115, Park Lane
19.2.79 to 21.2.79			Visit: Central Plant Protection Training Institute National Institute of Nutrition	Secunderabad Hyderabad Tel. 70148 Grams: HAIRCHE
21.2.79	AN	Lv	Hyderabad (By IC 515; 1455 hrs)	Stay at LODHI HOTEL
		Ar	Delhi	Lala Lajpatrai Rd New Delhi
22.2.79 to 24.2.79			Visit: Indian Agricultural Research Institute	Tel. 619422 Grams: LIVWELL
25.2.79			FREE	
26.2.79		Lv	Delhi (By Bus)	Stay at NDRI Guest House
		Ar	Karnal	
27.2.79			Visit: National Dairy Research Institute	
28.2.79		Lv	Karnal (By Bus)	Stay at PAU Teachers Home
		Ar	Ludhiana	
28.2.79 to 2.3.79			Visit: Punjab Agricultural University	
3.3.79		Lv	Ludhiana	
		Ar	Delhi (By Bus)	
		Lv	Delhi	
		Ar	Bombay (By IC 405; 1700 hrs)	
4.3.79			FREE	Stay at HOTEL AIRPORT PLAZA Nehru Road
5.3.79 to 7.3.79			Visit: Foods & Drug Admn. Bombay Port Bhabha Atomic Res Centre	Vile Parle Bombay Tel. 579476
8.3.79		Lv	Bombay (By IC 163, 169 or 153)	
		Ar	Goa	
9.3.79			Visit: National Institute of Oceanography	
10.3.79		Lv	Goa	
		Ar	Mysore	

WORKSHOP ON FOOD CONTAMINANTS MONITORING & CONTROL

FAO/UNEP SECOND INTERNATIONAL TRAINING COURSE FOR CONTROL OF ENVIRONMENTAL CONTAMINANTS IN FOOD -

Workshop Director: Majumder, S.K.

(March 12, 1979 to March 16, 1979)

SESSION I - Chairman: Natarajan, C.P.

March 12, 1979 - Monday - 0930-1100 Hrs

Welcome and Introductory remarks	- Natarajan, C.P.
A brief on FAO/UNEP Programmes	- Malik, R.K.
General remarks on Environmental Food Chemistry	- Berben, P.H.
An approach to the Workshop goals	- Majumder, S.K.
Vote of Thanks	- Manjrekar, S.P.

SESSION II - 1115-1700 hrs - Chairman: Malik, R.K.
Co-Chairman: Majumder, S.K.
Rapporteur: Muthu, M.

1115-1300	Monitoring - Concept and mode of setting up monitoring system	- Malik, R.K.
1300-1430	Lunch Break	
1430-1600	Food Control and Safety in Netherlands - An integrated approach	- Berben, P.H.
1600-1700	Problems of a Regulatory Analyst	- Majumder, S.K.

SESSION III - 0930-1300 hrs - Chairman: Berben, P.H. (13-3-79)

0930-1300	How to prepare programmes and projects for national action - General Principles & Proformae	- Berben, P.H. Malik, R.K. Chadha, D.S.
	Regional Food Control systems	- Theis, V.

SESSION IV - 1415-1730 hrs - Chairman: Chadha, D.S.
Co-Chairman: Manjrekar, S.P.
Rapporteur: Nagaraja, K.V.

Country Status Reports:

Mexico-1	Kenya-1
Mexico-2	Kenya-2
El Salvador	Ethiopia
Sudan	
Syria	
Chile	

March 14, 1979 - 0330-1300 hrs - FREE

SESSION V - 1430-1730 hrs - Chairman: Visweswariah, K.
Co-Chairman: Nagaraja, K.V.
Rapporteur: Basappa, S.C.

Investigational Data presentation -
Specialisation Exercises

1. Pesticide Gl.
2. Mycotoxin Gl.
3. Heavy Metal Gl.

SESSION VI

March 15, 1979 - Thursday - 0900-1300 hrs

Chairman: Sreenivasamurthy, V.
Co-Chairman: Berben, P.H.
Rapporteur: Basappa, S.C.

Status Reports:

Cameroon	Mauritius
Tanzania	Papua New Guinea
Ethiopia	Philippines
India	Malaysia

SESSION VII - 1415-1730 hrs - Chairman: Blink, D.
Co-Chairman: Kapur, O.P.
Rapporteur: Visweswariah, K.

Presentation of Projects or Programmes for follow up:

Mexico-1	Chile
Mexico-2	Kenya-1
Sudan	Kenya-2
Syria	El Salvador
Nepal	

SESSION VIII

March 16, 1979 - Friday - 0930-1130 hrs

Chairman: Majumder, S.K.
Co-Chairman: Malik, R.K.
Rapporteur: Ranganna, S.

Presentation of Projects or Programmes for follow up:

Ethiopia	Mauritius
India	Papua New Guinea
Cameroon	Philippines
Malaysia	Tanzania

1130-1600 hrs - Evaluation of Course and Contents:
(with lunch break 1300-1400 hrs)

Approach to Evaluation	- Blink, D.
Background and preparatory phase	- Manjrekar, S.P. Ranganna, S.
Microbial and Mycotoxins	- Sreenivasamurthy, V. Basappa, S.C.
Pesticide residue analysis and monitoring	- Majumder, S.K. Visweswariah, K.
Metal contaminants	- Kapur, O.P. Nagaraja, K.V.
Field visits/Training in Field Laboratories	- Chadha, D.S. Manjrekar, S.P.

SESSION IX

March 16, 1979 - Friday - 1600 hrs

VALEDICTORY FUNCTION

Director's Welcome	- Natarajan, C.P.
Report & Introspection on the FCA Course	- Majumder, S.K.
Participants' Notes	
Reflection by FAO/UNEP	- Malik, R.K.
Distribution of Certificates of Completion and Valedictory Address	- Chief Guest
Vote of Thanks	- Manjrekar, S.P.
T E A	

March 17, 1979 - Depart to Home countries

ANNEX V

FIRST AND SECOND FCA COURSE

LIST OF EQUIPMENT AND CHEMICALS DELIVERED

Item No.	Description of Equipment Instruments and Parts	Supplier	Qty.
1	Spectro Densitometer	Schoeffel Instruments, W. Germany	1
2	Explosion-proof waring blender	Beckman Instruments, Switzerland	2
3	UV Spectrophotometer Model 575	Perkin Elmer, USA	2
4	Atomic Absorption Spectrophotometer Model 460	Perkin Elmer, USA	1
5	Spectronic 20 with reflectance attachment	Bausch and Lomb, USA	1
6	Gas Cromatograph Mass Spectrometer	Hewlett Packard, USA	1
7	Cadmitin Hollow Cathode Lamp part no. 303-6016 and generation system	Coleman Instruments, USA	1
8	Flameless mercury analysis system to be used with Perkin Elmer Atomic Absorption Spectrometer (Cat. No. 303-0830)	Coleman Instruments, USA	1
9	Arsenic/Selenium Analysis - Analysis kit (cat. No. 303-0849)	Coleman Instruments, USA	1
10	Polarographic Analyser - Model 174 with stripping accessory recorder, electrolytic reagent, purification apparatus, Eppendorf pipettes, Disposable plastic filters, ultrasonic shaker, Fisher mini shaker	Princeton Applied Research, USA Princeton Applied, USA	1
11	Tungsten Halogen Source replacement		1
12	Eppendorf Micropipettes (2s microlitres size) model 2339	Princeton Applied, USA	1
	CHEMICALS		
13	Lanthanum Oxide	British Drug Houses, UK	1
14	Spinach, Orchard leaves, bovine liver	National Bureau of Standards, USA	1
15	Laboratory chemicals: 14 items	Messrs. BDH Chemicals. Ltd. U.K.	1
16	Laboratory chemicals: 14 items	Dr. O. Amato and Figli, S.R.L., Italy	1

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