

參加「營養、食品安全及生物安全之分析方法」國際訓練計畫 心得分享報告

報告人：徐慈鴻

103年9月26日

國際處提供訓練計畫之相關說明

「營養、食品安全及生物安全之分析方法」國際訓練計畫 中文摘要

時間：103年9月1日至14日(共14天)

地點：印度特倫甘納(Telangana)

主辦單位：[亞太農業生物技術論壇\(APCoAB\)](#)、[印度國際半乾旱熱帶作物研究所\(ICRISAT\)](#)

經費：主辦單位負擔獲選人員之訓練費及住宿費等當地費用，其餘如機票費等須由派員單位支應。


計畫目的：[加強亞太地區暨沙哈拉非洲國家農業研究體系及其相關公私立機構之食品安全、生物安全及相關科技等知識與技術。](#)

課程規劃：


1. 利用液相及氣相層析儀搭配質譜儀進行食品分析檢測。
2. 食品檢測之鑑定相關需求。
3. 食品微生物檢測。
4. 基因改造食品之生物安全、風險分析及毒性測試。

參加資格：[農業、食品研究、食品加工及食品生物技術領域之中高階職員暨管理人員](#)

訓練計畫的課程內容



資料皆有主辦單位並列



APAARI-ICRISAT
Training Program on Analytical Techniques in Nutrition,
Food Safety and Biosafety
 ICRISAT, Telangana, India
 (1-14 September 2014)

Program

Day 0 (August 31, 2014 | Sunday) Arrival and Check-in

Day 1 (01 September 2014 | Monday)

0900 – 1140 Opening session		
0900 – 1000	Registration and Tea	At PTTC, ICRISAT <i>Kirpal / Sharma</i>
1000 – 1010	Welcome Address	Dr. Kiran Sharma, Chief Operating Officer (CEC), Agribusiness and Innovation Platform (AIP) ✓
1010 – 1020	Training Program Overview	Dr. Pooja Bhatnagar Mathur, Scientist (PTTC), ICRISAT <i>Pooja / Kirpal / ikes/halu</i> ✓
1020 – 1035	Outcomes of APAARI regional consultations on food safety and biosafety	Dr. J.L. Kirpaloo, Co-ordinator, Biotechnology Program (APCoAB), APAARI <i>To Asia-Pacific Consortium.</i> ✓
1035 – 1050	Inaugural Address	Dr William D Dar, Director General, ICRISAT ✓
1050 – 1110	Address by Chief Guest	Dr. R.S. Paroda, Executive Secretary, APAARI <i>Paroda</i>
1110 – 1120	Vote of Thanks	Dr. Saikat Datta Mazumdar, COO, NutriPlus Knowledge Program, AIP-ICRISAT
1120 - 1140	Group Photo	

members in APB
APB a'parz
APAARI



PTTC



開幕點禮

開幕式後合影



Training Program on Analytical Techniques in Nutrition,
Food Safety and Biosafety

ICRISAT, Patancheru, Telangana, India
1- 14 September 2014

參與訓練計畫人員：

斯里蘭卡(3)、尼泊爾(1)、孟加拉(1)、泰國(1)、越南(1)、台灣(1)、菲律賓(2)、敘利亞(1)、肯亞(1)、迦納(2)、尚比亞(2)、辛巴威(2)，共計18名。

ICRISAT簡介

ICRISAT
Science with a human face

International Crops Research Institute for the Semi-Arid Tropics

Home | Who we are | What we do | Impacts | Locations | Newsroom | Careers / Tenders

Allied institutions

- AIP (Agribusiness and Innovation Platform)
- AVRDC (AVRDC - The World Vegetable Center) **亞蔬**
- IACD (ICRISAT Association for Community Development)
- ILRI (International Livestock Research Institute)
- ISH (International School of Hyderabad)
- IWMI (International Water Management Institute)
- PTTC (Platform for Translational Research on Transgenic Crops)

Global presence
Headquarters
ESA
WCA

About us
Our logo
Senior staff list
Governing board
Global presence
Financial statements
Allied institutions

th two regional
The farm has
ha), both
icultural Research

The International School of Hyderabad, which follows the British National Curriculum and caters to expatriate and Indian children between the ages of three and seventeen living in Hyderabad, is also located at the ICRISAT-Patancheru campus.

ICRISAT 簡介

Grant income

- ▣ Grant income 2013
- ▣ Grant income 2012
- ▣ Grant income 2011
- ▣ Grant income 2010
- ▣ Grant income 2009
- ▣ Grant income 2008
- ▣ Grant income 2007
- ▣ Grant income 2006
- ▣ Grant income 2005
- ▣ Grant income 2004

Partners

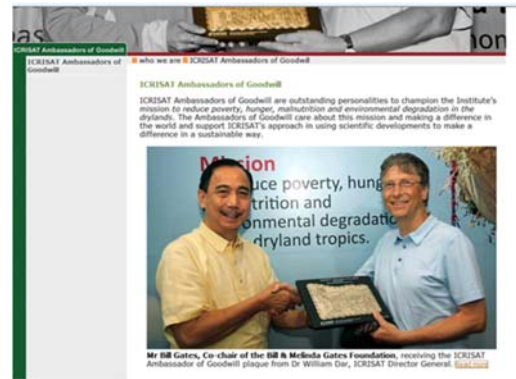
Donor flyers

Grant income-2010

ICRISAT, on behalf of the poor across the dry tropics, is enormously grateful to the following development investors for their foresight and generosity in helping the dryland poor escape hunger, poverty and environmental degradation:

Grant income from Donors for 2010

Donor	US\$ ' 000
Bill & Melinda Gates Foundation	10,996
USA	10,082
India	7,037
Challenge Programme	4,124
United Kingdom	3,920
Norway	2,459
European Union	1,942
Germany	1,832
Ireland	1,769
World Bank	1,740
Canada	1,619
Australia	1,345
IFAD	1,345
UNEP	1,025
Switzerland	891
CG Centers	663
Netherlands	608
Belgium	602
Sweden	553
AGRA	496
Japan	488
Private Seed Companies	471
McKnight Foundation	456
ASARECA	393
Global Crop Diversity Trust	350
Others	301
Sir Ratan Tata Trust	294
Asian Development Bank	274



參觀ICRISAT園區

Session: 1A	
1300 - 1400	ICRISAT tour and video presentation
About the session	Participants will be taken for a tour of ICRISAT to make them aware of the ongoing programs with special emphasis on initiatives undertaken by ICRISAT.
Speaker	Mr. M M Sharma, Visitors Service
Session: 1B	
1400 - 1445	Detailed overview of the Laboratory Training Program
About the session	Participants will be given a detailed overview of the training program to be conducted. Participants will be made aware of mode of training, various techniques that they will be trained on etc.
Speaker	Dr. Saikat Datta Mazumdar, Chief Operating Officer (COO), NutriPlus Knowledge Program, AIP, ICRISAT and Dr. Pooja Bhatnagar Mathur, Scientist (PTTC), ICRISAT
1445 - 1530	Tea Break and end of session



參觀ICRISAT園區



20140902-0904 食品安全訓練課程

Day 2 (02 September 2014 | Tuesday)

Session: 2	NCML Lab
0900 – 1700	Principles and applications of Liquid and Gas chromatography – LCMS/MS, GCMSMS and HPLC – in Food analysis
1030 – 1045	Tea
1300 – 1345	Lunch
1530 – 1545	Tea
About the session	Participants will be provided a theoretical overview on the principle and applications of Liquid and Gas chromatography in food analysis using LCMS/MS, GCMSMS and HPLC. They will be introduced to the techniques of sample preparation for analysis of Pesticide residues and Vitamins; Method development and validation; Analysis and quantification using respective instruments.
Trainer	Mr. Vidyasagar, Manager, Organic Division

Day 3 (03 September 2014 | Wednesday)

Session: 3	NCML Lab
0900 – 1700	Principles and applications of Spectroscopy – ICP-OES and AAS – in Food analysis
1030 – 1045	Tea
1300 – 1345	Lunch
1530 – 1545	Tea
About the session	Participants will be provided a theoretical overview on the principle and applications of Spectroscopy in food analysis using Inductively Coupled Plasma – Optical Emission Spectroscopy (ICP-OES) and Atomic Absorption Spectroscopy (AAS). They will be introduced to the various techniques of sample preparation for analysis of heavy metals; Method development and validation; Analysis and quantification using respective instruments.
Trainer	Mr. Ananda Kumar, Manager, Inorganic Division



Lecturers

Session: 4 NCML Lab	
0900 – 1700	Microbiological techniques for analysis of food-borne pathogens
1030 – 1045	Tea
1300 – 1345	Lunch
1530 – 1545	Tea
About the session	Participants will be acquainted with maintenance of cultures; Procedures of sub-culturing ; Precautions to be taken during microbial analyses; Media and sample preparation techniques; Identification of most common food-borne pathogens ; Microbial analytical techniques .
Trainer	Ms. Anitha Reddy, Manager, Microbiology Division



上課的conference room



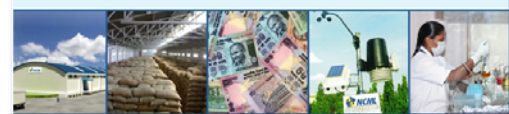
講解GC/MS-MS及LC-MS-MS之老師



和非洲四位同學於tea time時合影

食品安全-農藥殘留分析

名稱	修改日期	類型	大小
1. Sample prep.pptx	2014/8/26 下午 0...	Microsoft PowerP...	7,914 KB
2. Analytical Standards.pptx	2014/8/26 下午 0...	Microsoft PowerP...	3,822 KB
3. GC-MSMS.pptx	2014/8/26 下午 0...	Microsoft PowerP...	4,021 KB
4. LC-MSMS.pptx	2014/8/25 上午 1...	Microsoft PowerP...	5,102 KB
5. Sample and Standard Preparation fo...	2014/8/26 下午 0...	Microsoft PowerP...	745 KB
6. Sample Preparation for Fat soluble vi...	2014/8/26 下午 0...	Microsoft Word ...	57 KB
7. Test method for Fat soluble vitamins...	2014/8/26 下午 0...	Microsoft Word ...	76 KB



National Collateral Management Services Limited

Storage and labeling of Reference and Stock standards

- Individual location recorded
- Freezer Temperature monitored
- Avoid condensation on removal

Matrix-matched calibration

- Advantages
 - Helps to compensate for matrix effect
- Disadvantages
 - Labor intensive
 - Matrix compensation difficult to achieve
- Compromise
 - Group sample types
 - Reduce amount of matrix analysed
 - Matrix compensation difficult to achieve
- Standard addition may be the only accurate method of calibration

GC-MS: quadrupole

Mass Selective Detectors ionise analytes in a process that breaks the analytes apart into predictable fragments. The collection of fragments is very unique to a given chemical compound and thus provides precise identification of the analytes as they pass through the detector.

Traceability of Standards

- Importance of Traceability
 - Audit purposes
 - Investigation of problems
- Means of achieving good traceability
 - LIMS
 - Record keeping
 - Labeling
 - Aliquots of standard solution are Archived

Dispersive clean-up options

Removal of potentially interfering matrix components

1 mL of the upper layer + 150 mg MgSO₄

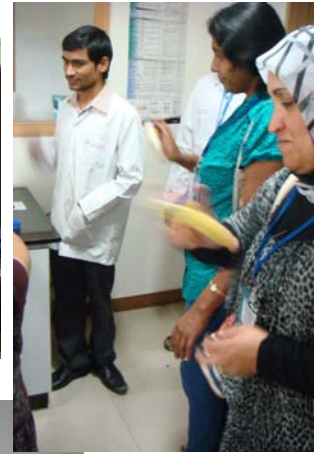
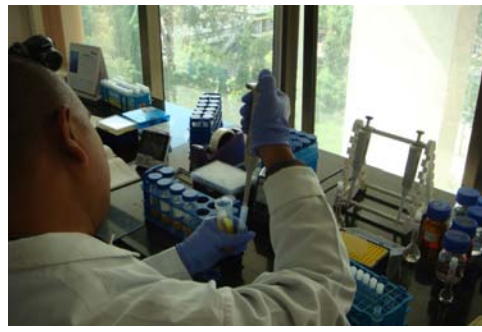
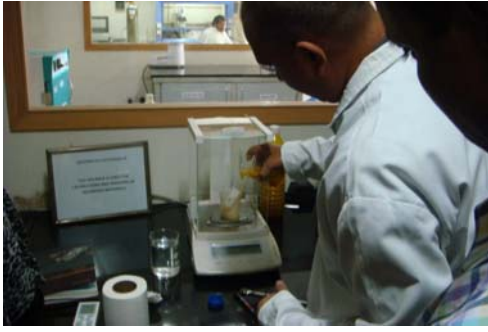
PSA
Carbon
C₁₈
In various combinations

- Can use other sorbents?
- Sorbents from different manufactures do not always behave in the same way
- Wide choice of commercial products in tubes and sachets

The two routes in ion production

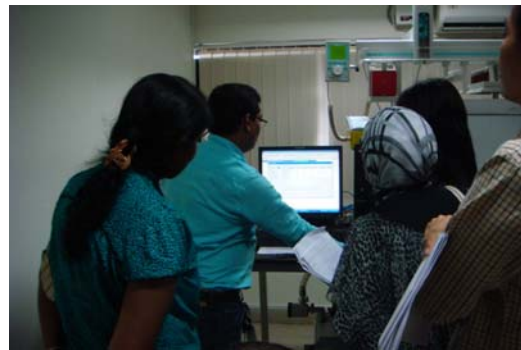
In practice need more than one analysis but ES+ provides best response for more compounds

執行QuEChERS的前處理



學員執行秤樣品、加乙腈、震盪、加硫酸鎂等動作
其他添加、離心及加入C18、PSA等步驟由實驗室人員執行

農藥殘留分析儀器設備

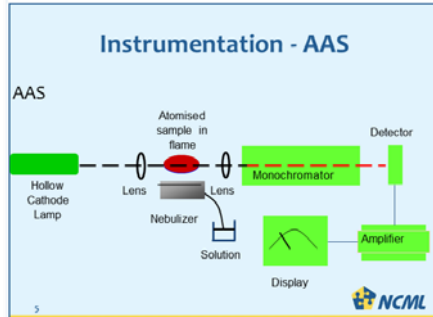


1台GC-ECD、1台GC/MS-MS
1台HPLC-DAD、1台LC/MS-MS

食品安全-重金屬含量分析

新增資料夾

名稱	修改日期	類型	大小
1. Sample and Standard Preparation fo...	2014/8/26 下午 0...	Microsoft PowerP...	585 KB
2. Analysis of metals by AAS.pptx	2014/8/26 下午 0...	Microsoft PowerP...	1,078 KB
3. Analysis of elements by ICP.pptx	2014/8/26 下午 0...	Microsoft PowerP...	1,423 KB
4. Sample Preparation for metals.docx	2014/8/26 下午 0...	Microsoft Word ...	54 KB
5. Test methods for Metals.docx	2014/8/26 下午 0...	Microsoft Word ...	69 KB



Instrumentation - ICP

What is ICP-OES

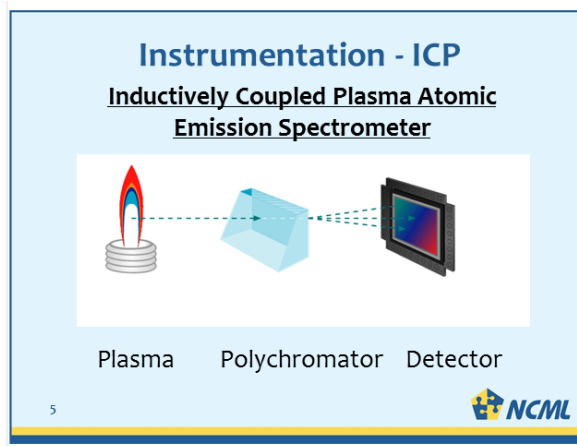
- ❖ Inductively Coupled Plasma Optical Emission Spectrometer
- ❖ Atomic emission spectroscopy (AES or OES) uses quantitative measurement of the optical emission from excited atoms to determine analyte concentration

NCML

Analysis of Metals in Food samples

Destruction of Organic matter :

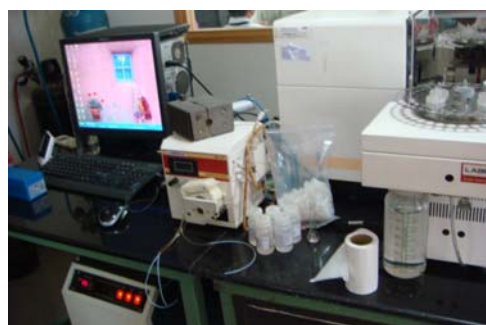
- ❖ Wet oxidation
- ❖ Dry Ashing and
- ❖ Microwave Digestion



重金屬含量分析儀器設備



學員只執行秤樣品，其他步驟由實驗室人員操作



食品安全-食因性致病微生物檢測

列印 燒錄 新增資料夾

名稱	修改日期	類型	大小
1. Micro Biology training material book...	2014/8/26 下午 0...	Adobe Acrobat D...	1,585 KB
2. Microbiology Presentation.pdf	2014/8/26 下午 0...	Adobe Acrobat D...	1,983 KB



Detection of Food-Borne Pathogens

Must be rapid and sensitive

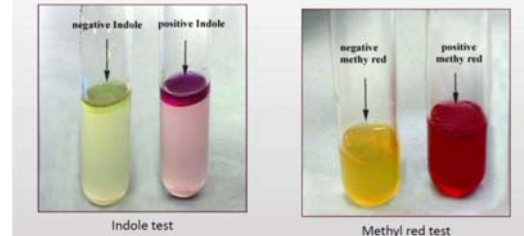
Methods include:

- culture techniques – may be too slow
- immunological techniques - very sensitive

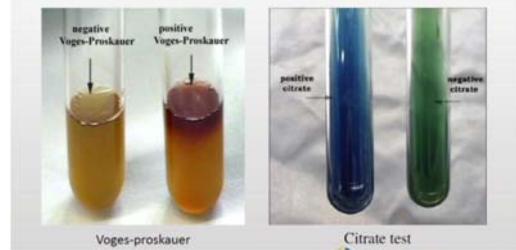
Molecular techniques

- probes used to detect specific DNA or RNA
- sensitive and specific

Testing – E. Coli - Biochemical Confirmation



Testing – E. Coli - Biochemical Confirmation Continue ...



微生物檢測觀摩



全副武裝



天平校正



收樣單

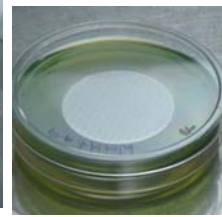
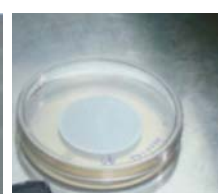
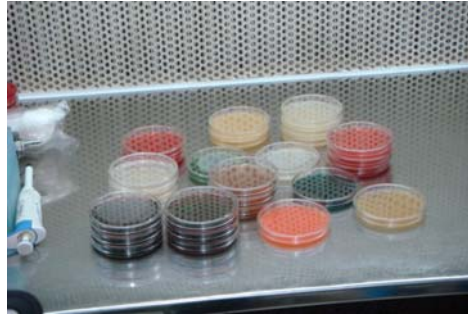
TRF No.: 1540823
Date: 5/7/14
SAMPLE DETAILS & TESTS REQUIRED

Sl. No.	Sample ID	Sample Name	Parameters	Test Method	Assigned to	Analysis TAT
1	1447	1203	Microbiology Turbidity TS TS P TS: 145/22 2004		Ms Anika Reddy	5/7/14

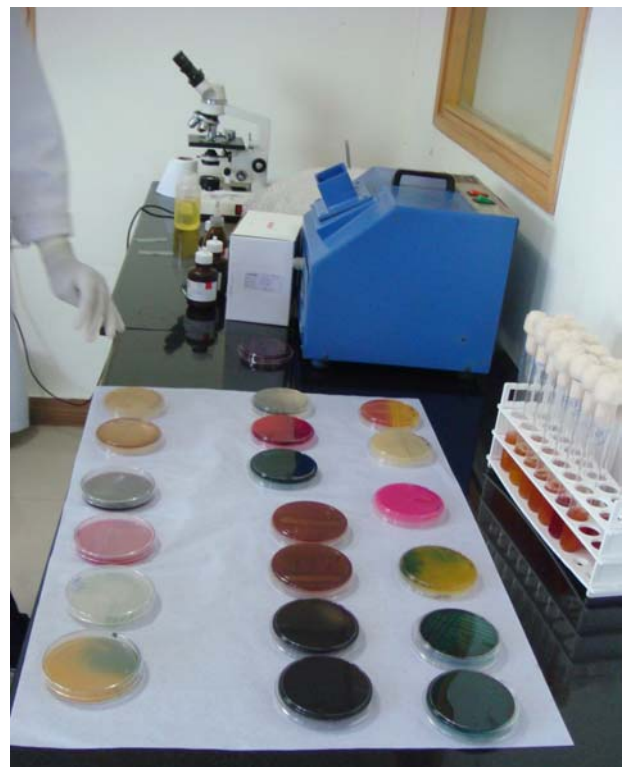
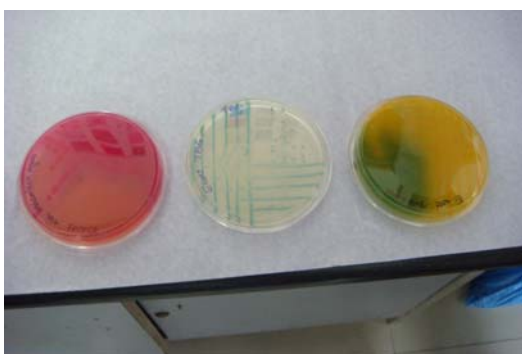


殺菌室的設備及裝置

實際樣品的微生物檢測



微生物培養結果觀察室(Results Reading Room)



印度國的食品安全標準局

www.fssai.gov.in

भारतीय खाद्य संरक्षा एवं मानक प्राधिकरण
Food Safety and Standards Authority of India

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Science in FSSAI
Imported Food
Int. Co-operation
Product Approval
Repealed Acts / Rules

Codex
Codex India
E-Newsletter (Vol.I, Issue.IV)
E-Newsletter (Vol.I, Issue.III)

सुरक्षित आहार, स्वास्थ्य का आधार

Building healthy India with safe food

What's New

Preparation of panel of suitable candidates for filling up vacant posts through transfer on deputation on Foreign Service terms basis(Dated: 16-09-2014).

Food Product Approval System (FPAS) online launched (Dated: 11-09-2014).
FPAS Online

Minutes of the 11th meeting of Central Advisory Committee of Food Safety and Standards Authority of India(Dated: 02-09-2014).

Draft Food Safety and Standards (Food Products Standards and Food Additives) Amendment Regulations, 2014 (relating to use of Aspartame and Acesulfame Salt) Dated : 11-09-2014).

正在下載圖片 http://www.fssai.gov.in/Portals/0/fssai_ads/cons/2.jpg...

1

MINISTRY OF HEALTH AND FAMILY WELFARE

(Food Safety and Standards Authority of India)

Notification

New Delhi, dated the 1st August, 2011

F.No. 2-15015/30/2010 Whereas in exercise of the powers conferred by clause (i) of sub section (2) section 92 read with section 20 of Food Safety and Standards Act, 2006 (34 of 2006) the Food Safety and Standards Authority of India proposes to make Food Safety and Standards Regulations in so far as they relates to Food Safety and Standards (Contaminants, Toxins and Residues) Regulations, 2011, and;

Whereas these draft Regulations were published in consolidated form at pages 1 to 776 in the Gazette of India Extraordinary Part III – Section 4 dated 20th October 2010 inviting objections and suggestions from all persons likely to be affected thereby before the expiry of the period of thirty days from the date on which the copies of the Gazette containing the said notification were made available to the public;

And whereas the copies of the Gazette were made available to the public on the 21st October 2010;

And whereas objections and suggestions received from the stakeholders within the specified period on the said draft Regulations have been considered and finalized by the Food Safety and Standards Authority of India.

Now therefore, the Food Safety and Standards Authority of India hereby make the following Regulations, namely,-

FOOD SAFETY AND STANDARDS (CONTAMINANTS, TOXINS AND RESIDUES) REGULATIONS, 2011

重金屬限量

鉛、銅、砷、鋅、鎘、鉻、鎳、汞、甲基汞、錫

Name of the metal contaminants	Article of food	Parts per Million by weight
(1)	(2)	(3)
1. Lead	(i) Beverages:	
	Concentrated soft drinks (but not including concentrates used in the manufacture of soft drinks)	0.5
	Fruit and vegetable juice (including tomato juice, but not including lime juice and lemon juice)	1.0
	Concentrates used in the manufacture of soft drinks, lime juice and lemon juice	2.0
	(ia) Baking powder	10
	(ib) Edible oils and fats	0.5
	(ic) Infant Milk substitute and Infant foods	0.2
	(id) Turmeric whole and powder	10.0
	(ii) Other foods	
	Anhydrous dextrose and dextrose monohydrate, edible oils & fats, refined white sugar (sulphated ash content not exceeding 0.03 per cent)	0.5
	Ice-cream, iced lollies and similar frozen confections	1.0
	Canned fish, canned meats, edible gelatin, meat extracts and hydrolysed protein, dried or dehydrated vegetables (other than onions)	5.0
	All types of sugar, sugar syrup, invert sugar and direct consumption coloured sugars with sulphated ash content exceeding 1.0 per cent	5.0
	Raw sugars except those sold for direct consumption or used for manufacturing purpose other than the manufacture of refined sugar.	5.0
	Edible molasses, caramel liquid and solid glucose and starch conversion products with a sulphated ash content exceeding 1.0 per cent	5.0
	Cocoa powder	5.0 on the dry fat free substance
	Yeast and yeast products	5.0 on the dry

毒性物質限量

2.2 Crop contaminants and naturally occurring toxic substances

2.2.1

1. No article of food specified in column (2) of the Table below shall contain any crop contaminant specified in the corresponding entry in column (1) thereof in excess of quantities specified in the corresponding entry in column (3) of the said table :

S. No	Name of the Contaminants	Article of Food	Limit µg/kg
1.	Aflatoxin	All articles of food	30
2.	Aflatoxin M ₁	Milk	0.5
3.	Patulin	Apple juice & Apple juice ingredients in other beverages	50
4.	Ochratoxin A 赭麴毒素 A	Wheat, barley & rye	20

2. Naturally occurring Toxic Substances.

The toxic substances specified in column (1) of the Table below, which may occur naturally in any article of food, shall not exceed the limit specified in the corresponding entry in column (2) of the said Table :-

S.No	Name of substance	Maximum limit
1	Agaric acid 鬆萆酸	100ppm
2	Hydrocyanic acid HCN 氫氰酸	5ppm
3	Hypericine 海棠素	1ppm
4	Saffrole 黃樟素	10ppm

農藥殘留量

2.3: Residues

2.3.1: Restriction on the use of insecticides.

1) Subject to the Provisions of regulation 2.3.1 (2), no insecticides shall be used directly on articles of food

Provided that nothing in this regulation shall apply to the fumigants which are registered and recommended for use as such on articles of food by the Registration Committee, constituted under section 5 of the Insecticides Act, 1968 (46 of 1968).

2) The amount of insecticide mentioned in Column 2 on the foods mentioned in column 3, shall not exceed the tolerance limit prescribed in column 4 of the Table given below :

Sl.No.	Name of Insecticides	Food	Tolerance limit mg/kg.ppm)
(1)	(2)	(3)	(4)
1	Aldrin, dieldrin (the limits apply to aldrin and dieldrin singly or in any combination and are expressed as dieldrin)	Foodgrains	0.01
		Milled Foodgrains	Nil
		Milk and Milk products	0.15 (on a fat basis)
		Fruits and Vegetables	0.1
		Meat	0.2
		Eggs	0.1 (on a shell free basis)
2	Carbaryl	Fish	0.2
		Foodgrains	1.5

參觀ISO22000食品加工廠

Day 5 (05 September 2014) | Friday

Session: 5	Visit to an ISO 22000 certified plant
About the session	Participants will be taken for a visit to an ISO 22000 certified plant so that they can acquaint themselves with various processes and procedures that are mandatory as per ISO 22000.





海得拉巴市中心參觀

Day 6 (06 September 2014 | Saturday)

Sight seeing	
0900 - 1900	Sightseeing of Hyderabad
About the session	Participants will be taken around the city of Hyderabad to show places of importance. They will be provided with Snacks, Tea, and Lunch as part the tour.

Day 7 (07 September 2014 | Sunday)

Break

簡介ISO17025：2005相關內容

簡介國際食品貿易的管控及智財權體制

Day 8 (08 September 2014 | Monday)

Session: 6A	NPK Lab, AIP
0900 – 1230	Accreditation requirements of food testing laboratories.
1030 – 1045	Tea
1230 – 1330	Lunch
1545 – 1600	Tea
About the session	Participants will be trained the requirements of ISO/IEC 17025:2005, which is a basic standard against which food testing laboratories should get accredited.
Trainer	Mr. Prashant Bagade, Consultant, NPK Program, AIP, ICRISAT.
Session: 6B	PTTC
1330 – 17:00	Regulatory and Intellectual Property Regime in International Food Trade
About the session	<p>Legal and regulatory system has become increasingly important in many areas of agri-food including R&D, food testing, certification, foreign trade, technology transfer, Marketing and business, access to genetic resources and traditional knowledge. From international trade point of view, two aspects are important:</p> <ul style="list-style-type: none"> • WTO Agreement on Technical Barriers to Trade (TBT) including Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) and Codex Alimentarius. • WTO- TRIPS agreement on IPRs.
Speaker	Dr. Suryamani Tripathi, Visiting Scientist, PTTC, ICRISAT

10/2/2014

上課地點-AIP



牆壁壁面展示農產品及其加工品



Bt基因轉殖棉花種子



簡介ISO-17025的內容

第4章(管理要求)、第5章(技術要求)

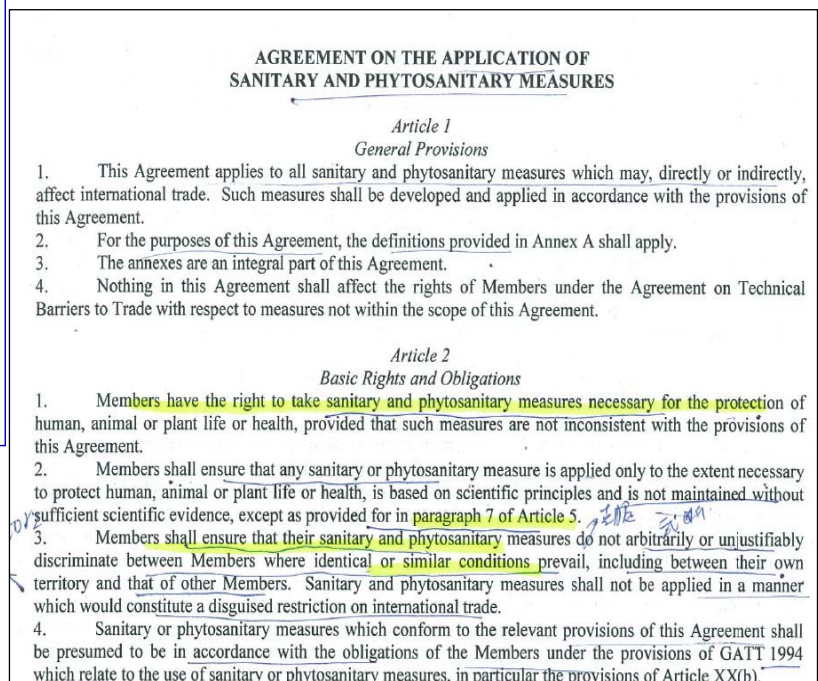


1. Food and feed testing laboratories Best practices manual.pdf
2. Guidance document on analytical quality control and validation procedures for pesticide residue an..
3. 21 CFR 58 - GLP Regulations.pdf
4. ISO-IEC 17025:2005.pdf



國際食品貿易的管控及智財權體制

先簡介Agreement on the Application of Sanitary and Phytosanitary Measures，簡稱SPS協定(食品安全檢驗與動植物防疫檢疫措施協定)的內容，針對基因轉殖食品的進口，分成原告組、被告組及裁判組，依據SPS的條文進行答辯。





FTL TRAINING: MOCK CASE STUDY: AIP-ICRISAT

MEASURES AFFECTING THE APPROVAL AND MARKETING OF BIOTECH BASED FOOD PRODUCTS

Background:
The following trade dispute between THANDALA and MAKANA has been submitted to the Chairman of the Dispute Settlement Body, WTO.

Congressman

- Short title of dispute: **Approval and Marketing of Biotech based food Products**
- Complainant: **MAKANA**
- Respondent: **THANDALA**
- Third Party: **HALDI**
(HALDI joined in the consultations because of its substantial systemic interest on account of the implications of the issue for the implementation of the Agreement on the Application of SPS and the Agreement on Technical Barriers to Trade.)

2012 0516

- **WTO Agreements cited:** (as cited in request for consultations) Sanitary and Phytosanitary Measures (SPS) and Technical Barriers to Trade (TBT)
- **Complaint by Makana:** On 14 May 20012, Makana requested consultations with the Thandala concerning certain measures taken by the Thandala affecting imports of agricultural and food imports from Makana. Regarding Thandala-level measures, Makana asserted that the moratorium applied by the Thandala since October 2007 on the approval of biotech products has restricted imports of agricultural and food products especially Genetically Modified Food Products¹ from Makana. Regarding safeguard measures, Makana asserted that a number of Thandala authorities maintain national marketing and import bans on biotech products even though those products have already been approved by the international organizations for import and marketing across the globe (including CODEX norms of FAO).

2007/10

- **Measure at issue:** (i) Alleged general Thandala moratorium on approvals of biotech based food products; (ii) Thandala measures allegedly affecting the approval of specific biotech based food products; and (iii) Thandala safeguard measures prohibiting the import/marketing of specific biotech based food products within its territory.

Alleged moratorium

Product at issue: Agricultural biotech-based-food products from the Makana and Haldi.

Alleged is/adj/指

moratorium

¹ Genetically modified foods are derived from organisms whose DNA has been altered through the insertion of genes from one organism into a second organism in order to suppress, encourage, or otherwise alter particular genetic traits in the second organism

SPS的協定的精神

簡介 Agreement on the Application of Sanitary and Phytosanitary Measures 簡稱 SPS 協定「食品安全檢驗與動植物防疫檢疫措施協定」。

係針對食品衛生安全與動植物健康標準所訂定之基本國際貿易規範，它允許各國可訂定自己的標準，但也規定相關法規與檢疫條件須有科學證據，且以符合保護人類、動植物生命或健康所必須者為限；此外，些措施不可對具有相同或類似情況的國家採取任意或不當的歧視。

SPS 協定鼓勵會員採用國際標準、準則及建議，然而倘會員可提出科學上的證據，例如適當的風險評估，也可採取較國際規範為高的保護措施。該協定也允許會員採用不同的標準與不同的方法來檢驗產品。



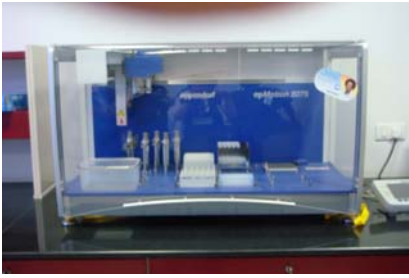
參觀作物基因轉殖實驗室及轉殖作物栽培區 簡介基因轉殖作物的安全性評估

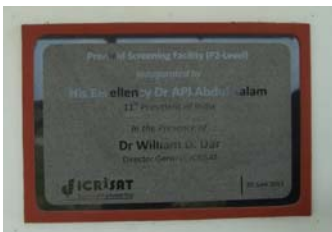
Day 09 (09 September 2014 | Tuesday)

Session 7A	PTTC
0900 – 1030	Briefing & Visit to Genetic Transformation laboratory and containment greenhouses
1030 – 1045	Tea
1045 – 1300	Problem formulation for food safety assessment Assessing foods derived from genetically engineered plants
1300 – 1400	Lunch
Session: 7B	PTTC
1400 – 1530	GM Crop databases
1530 – 1600	Tea
About the sessions	The sessions will help participants gain a baseline understanding of the concepts and principles of GE food safety assessment, and determine what additional studies may be appropriate to the safety assessment.
Speakers	Drs KK Sharma and Pooja Bhatnagar-Mathur, ICRISAT <i>(pupa / bhatnagar)</i>

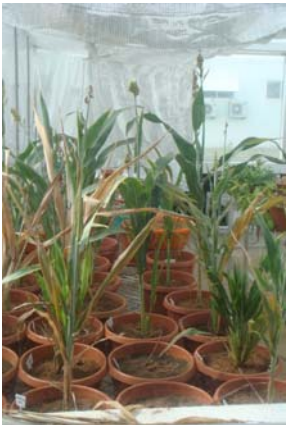
基因轉組培室及轉殖作物栽培區







Crop	Fertilizer at the time of sowing	Seed
Groundnut	SAP (0.18:0.1) 100 kg/ha (@ 2g/plot)	Thiam @ 1g/ha (Dip the seed in imidazole)
Chickpea	DAP (18:46:0) 150 kg/ha (@ 2g/plot)	Thiam @ 1g/ha (Dip the seed in imidazole)
Pigeonpea	DAP (18:46:0) 100 kg/ha (@ 2g/plot)	Thiam @ 1g/ha (Dip the seed in imidazole)
Millet	DAP (18:46:0) 100 kg/ha (@ 2g/plot)	Thiam @ 1g/ha (Dip the seed in imidazole)
Sorghum	AP (20:20:0) 200 kg/ha (@ 4g/plot)	Thiam @ 1g/ha (Dip the seed in imidazole)

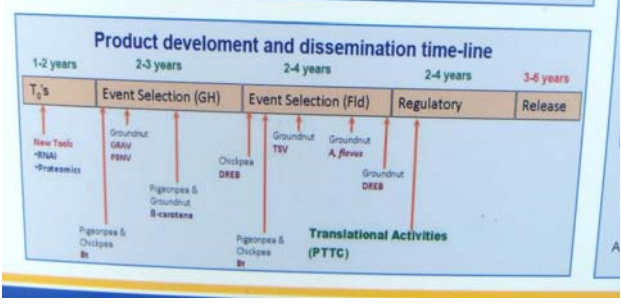
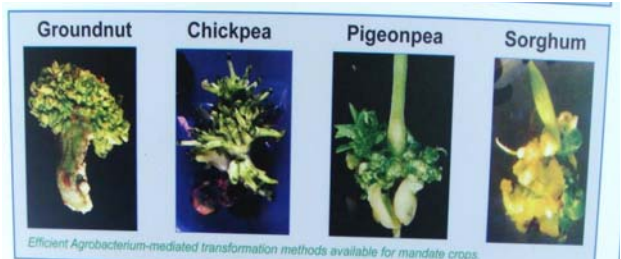


Date	Temp	Humidity	Water	Light	CO2	Plant Health	Observations	Remarks
01/07								
02/07								
03/07								
04/07								
05/07								
06/07								
07/07								
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30/07								

印度重要的轉基因作物種類及其研發和推廣的time line

Current status of genetically engineered crops		
Constraint		Genes
Groundnut		
Viruses	Indian Peanut Clump Virus (IPCV)	Coat protein/Replicase
	Groundnut Rosette disease (GRAV)	Coat Protein
	Peanut bud necrosis virus (PBNV)	Nucleocapsid/Antisense/ RNAi
	Tobacco streak virus (TSV)	Coat Protein
Fungi	<i>Aspergillus flavus</i> , <i>Cercospora</i> spp	Rice chitinase, Def1, Def4, 13S LOX, 9S LOX (RNAi)
	Drought	rd29A:DREB1A
Abiotic Stress	Drought	rd29A:DREB1A
Biofortification	β-carotene	Oleo:PSY1
		Oleo:PSY1::GSP;β-LYC RNAi for ε-LYC and β-CHY
Pigeonpea		
Insect	<i>Helicoverpa armigera</i>	Bt <i>cry1Ab</i>
		SBTI
		Bt <i>cry1Ac</i>
		Bt <i>cry2Aa</i>
Biofortification	β-carotene	Oleo:PSY1
		Oleo:PSY1::35S:β-LYC
Chickpea		
Insect	<i>Helicoverpa armigera</i>	Bt <i>cry1Ab</i>
		Bt <i>cry1Ac</i>
		Bt <i>cry2Aa</i>
		Bt <i>cry1AaBbCc</i>
Abiotic Stress	Drought	35S:P5CSF129A
		rd29A:DREB1A

Groundnut 落花生
Pigeon pea 樹豆
Chickpea 鷹嘴豆



轉基因作物的安全性評估及計畫形成和執行前的評估



Risk Assessment

EXAMPLE:
Paracetamol (drug for fever):

- at low doses is therapeutical
- at high doses is potentially lethal

Does paracetamol pose a risk to us?

Risk Assessment Risk = f (Hazard, Exposure)

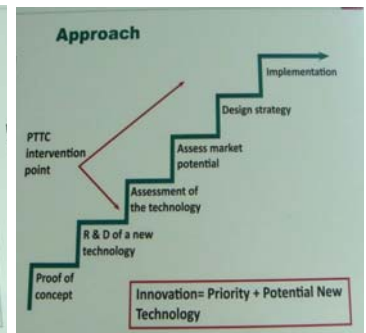
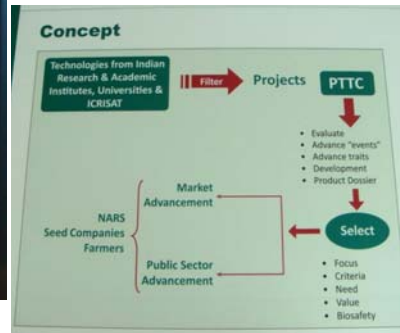
- **NO** if we do not take it (no exposure)
- **YES** if we exceed the recommended dose (high exposure)
- **NO** if we follow the recommended dose (low exposure)

Same hazard, different exposure

Basic concepts

- The assumption is that the conventional crop is well known and has been previously cultivated.
- Also that the crop has been previously used for food and feed so there is a history of previous exposure and history of safe use

Translational Research on Transgenic Crops



實質等同性評估
包括過敏源、主要營養成分、微量營養素等等比較、毒理試驗等等。



轉基因作物的相關研究成果

Transgenic Pigeonpea for Insect Resistance

- The total world production of pigeonpea adds upto 4.4 million tonnes (FAOSTAT, 2011)
- India is the largest producer contributing to about 75-85% of the world total production followed by Myanmar and United Republic of Tanzania (FAOSTAT, 2011)
- Crop losses due to pod borer (*Helicoverpa armigera*) in pigeonpea accounts to 15-100%, amounting to annual yield losses of over USD 2 billion worldwide.

Untransformed control | Transgenic event

Differential response in untransformed and transgenic pigeonpea for pod borer infestation as evident in Pod and Flower Twig Bioassays.

Variation in larval growth and development, abnormal pupation and adult emergence following feeding on transgenics

Evaluation for yield traits under drought stress: 2008-2011

Yield responses

Root responses

Yield differences under confined in-soil field trial (A) transgenic events (C and D) showed clear yield advantage through better seed fill as compared to their untransformed counterpart (B).

Higher root dry weight with significantly higher Root Length Density at depth 40-90 cm.

Transgenic resistance to *Aspergillus flavus* & Aflatoxin

Aflatoxin B₁

Genes/Technologies

- Chitinase
- Lipoxygenase (13S LOX)
- RNAi (9S LOX)
- Defensins

簡介印度有關轉基因作物的生物安全評估及相關指引 參觀ICRISAT的基因體中心及種源庫

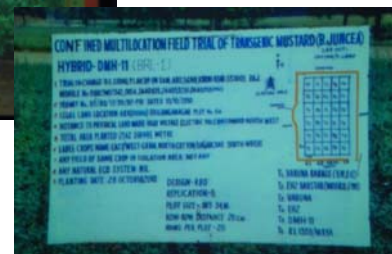
Day 10 (10 September 2014 | Wednesday)

Session 8	PTTC
0930 – 1200	Bio-safety; Risk analysis for GMOs – concepts, methods, and issues; Use of GMOs under containment, confined, and limited field trials and post-release monitoring of GMOs;
1030 – 1045	Tea
1200 – 1300	Lunch
1300 – 1430	Hands on training on GMO analysis using Molecular tools
1430 – 1545	Compositional analysis of GM food crops
1545 – 1600	Tea
About the session	Session will emphasize on how to identify appropriate risk hypotheses, consider the applicability of data developed for other jurisdictions. Qualitative and /or quantitative determination of genetically modified organisms in corn or soybean using molecular techniques.
Trainers	Drs. Vibha Ahuja, General Manager, BCIL, India Dr. Sudip Ghosh, National Institute of Nutrition, Hyderabad, India Dr. B. Sesikeran Former Director of National Institute of Nutrition, Hyderabad, India

簡介印度執行GE作物田間試驗的標準操作流程



NIN (National Institute of Nutrition)
前任所長



<http://dbtbiosafety.nic.in/home.htm>

印度生物安全相關資訊官方網站

Department of Biotechnology - Windows Internet Explorer
 http://dbtbiosafety.nic.in/

提供國際組織、國家的對GE的生物安全評估資料

提供操作流程及各類指引

ACTS & RULES

NATIONAL

- The Environment (Protection) Act, 1986
- Rules for the manufacture, use, import, export & storage of
- Drugs and Cosmetics Rules - 1988 (eight amendment)
- Drug Policy
- Schedule-Y of Drugs and Cosmetics Act
- Seeds Policy - 2002
- Protection of Plant Varieties and Farmers' Rights Act
- DGFT Notification No. 2(RE-2006) / 2004-2009, 20
- Food Safety and Standards Act 2006
- Plant Quarantine Order, 2003

INTERNATIONAL

- Convention on Biological Diversity (1992)
- Cartagena Protocol on Biosafety to the Convention on
- Codex Alimentarius

OTHER COUNTRIES

- Australia
- Bangladesh - Biosafety Guidelines of Bangladesh, Governm
- Canada - Canadian Environmental Protection Act, 1999
- Egypt - Biosafety Regulations and Guidelines, Ministry of Ag
- European Union
- Ghana - National Biosafety Framework For Ghana Administr...
- Nigeria - Guidelines on Biosafety for Nigeria, Federal Ministry of Agriculture and Natural Resources, 1994
- Pakistan - National Biosafety Guidelines, Pakistan Environmental Protection Agency, 2005
- Singapore - Biosafety Guidelines For Research On Genetically Modified Organisms (GMOs), GMAC, 2006
- South Africa
- South Korea

GUIDELINES

NATIONAL

- Recombinant DNA Safety Guidelines - 1990
- Recombinant DNA Safety Guidelines and Regulations - 1990
- Revised Guidelines for Safety in Biotechnology - 1994
- Revised Guidelines for Research in Transgenic Plants & Guidelines - 1998
- Guidelines for Generating Pre-clinical and Clinical Data for r-DNA Based Vaccines, Diagnostics and other Biologicals - 1999
- Guidelines and Standard Operating Procedures (SOPs) for Confined Field Trials of Regulated Genetically Engineered (GE) Plants - 2008
- Guidelines for the Safety Assessment of Foods Derived from Genetically Engineered Plants - 2008
- Protocols for Food and Feed Safety Assessment of GE crops - 2008

INTERNATIONAL

- OECD Guidelines
- ICH Guidelines
- WHO Biosafety Manual

Introduction
 Acts and Rules
 Guidelines
 Steps Involved
 Committees
 Formats
 Links
 IBSC Information
 Guidelines and Handbook for IBSC
 RCGM Application Status
 RCGM Minutes
 Standing Committee
 GEAC Information
 What's New
 Archive
 FAQ's

Instructions for updating IBSC information
 CD ON BIOSAFETY GUIDELINES, RULES, REGULATIONS AND PROTOCOLS

ICRISAT的基因體研究中心



參觀ICRISA的種源庫中心




參訪印度國家營養研究所(NIN)

Day 11 (11 September 2014 | Thursday)

Session: 9		NIN Hydreabad
0900 – 1600	Allergenicity and toxicity assessment in GM crops;	
1030 – 1045	Tea	
1230 – 1330	Lunch	
1545 – 1600	Tea	
About the session	Allergenicity assessment of GMO crops and assessing their potential toxicity	
S.No	Subject	Resource person
1	Inaugural Address on Importance of Food Safety	Dr. Kalpagam Polasa, Director, NIN
2	Preclinical (Pre-Market) Safety studies in Biosafety evaluation	Dr. B. Dinesh Kumar, Scientist 'E'
3	Demonstration in Animal Experimentation	Dr. P. Suresh Babu, Scientist 'F' Dr. N. Harishankar, Scientist 'C'
4	Importance of Clinical Hematology & Histopathology in Biosafety	Dr. P. Uday Kumar, Scientist 'F'
5	Molecular detection methods for GMO's - Demonstration and Hands-on	Dr. Sudeep Ghosh
6	Bioinformatic tools for Allergenicity Assessment	Dr. Vishnuvardhana Rao, Scientist 'E'
7	Pepsin digestibility and Thermal Stability assays for Allergenicity assessment	Dr. S. Vasanthi, Scientist 'D'
8	Biostatics procedures	Mr. K. Venkaiah, Scientist 'F'

印度國家營養研究所(NIN)

1918年於英國殖民時期所創立之國家級研究單位



NATIONAL INSTITUTE OF NUTRITION, Hyderabad, INDIA.
राष्ट्रीय पोषण संस्थान, हैदराबाद, भारत.

India's premier nutrition research institute working under the aegis of Indian Council of Medical Research (ICMR), Ministry of Health and Family Welfare, Government of India.

Vision
To achieve optimal nutrition of vulnerable segments of population such as women of reproductive age, children, adolescent girls and elderly by 2020.

Mission
To enable food and nutrition security conducive to good health, growth & development and increase productivity through dedicated research, so as to achieve the national nutrition goals set by the government of India in the national nutrition policy.

M.Sc. Entrance test results 2014-15

All donations towards the Prime Minister's National Relief Fund (PMNRF) are notified for 100% deduction from taxable income under Section 80G of the Income Tax Act, 1961.

The venue for the M.Sc. (AN) entrance examination to be held on 10th Aug, 2014, is Siddhartha Medical College, Vijayawada.

34 th Laboratory Animal Supervisor's Training Course - 2014

No of Hits
631280

RIGHT TO INFORMATION

National Institute of Nutrition
Jamaal-Osmania PO

開幕及參訪流程安排



每位學員先介紹的名字、國家和工作單位讓所長知道。
所長：Polasa女士致詞

Training Program
On
Analytical Techniques used in Nutrition, Food Safety and Bio-safety
(September 1-14, 2014, ICRISAT, Telangana, India)

RESOURCE TRAINING ON
ALLERGENICITY AND TOXICITY ASSESSMENT IN GM FOODS

Date: 11th September, 2014,
National Institute of Nutrition (ICMR) Hyderabad, Telangana, India

9:00 - 9:15am	Address on Importance of Food Safety	Dr. Kalpagem Polasa, Director, NIN
9.15-9.25am	Preclinical (Pre-Market) Safety studies in Biosafety evaluation	Dr. B. Dinesh Kumar, Scientist 'E' ✓
9.25 - 9.30am	Importance of Histopathology in Pre-market survey	Dr. P. Uday Kumar, Scientist 'E' ✓
9.30-9.40am	Immunology assessment	Dr. R. Hemalatha, Scientist 'E' ✓
9.40-10.00am	Allergenicity assessment tools for GM Crops.	Dr. S. Vasanthi, Scientist 'D' ✓ (2)
HIGH-TEA 10.00am-10.15am		
Demonstration - Three groups will be formed		
10.15-11.00am	Group A Pepsin digestability assay	Dr. P. Suresh Babu, Scientist 'E' ✓
	Group B Pathology / Animal Experimentation & Immunology	Dr. P. Uday Kumar, Scientist 'E' ✓
	Group C Bioinformatics screening	Dr. R. Hemalatha, Scientist 'E' ✓
11.00-12.00noon	Group B Pepsin digestability assay	Dr. R. Hemalatha, Scientist 'E' ✓
	Group C Pathology / Animal Experimentation & Immunology	Dr. B. Dinesh Kumar, Scientist 'E' ✓
	Group A Bioinformatics screening	Dr. M. Vishnuvardhana Rao, Scientist 'E' ✓
12.00 -1.00pm	Group C Pepsindigestability assay	Dr. S. Vasanthi, Scientist 'D' ✓
	Group A Pathology / Animal Experimentation & Immunology	Dr. N. Harishankar, Scientist 'C' ✓
	Group B Bioinformatics screening	
LUNCH 1:00 - 2:00 PM (International Hostel)		
2:00 -3:30pm	Molecular detection methods for GMO's - Demonstration and Hands -on	Dr. Sudeep Ghosh, Scientist 'D' ✓
TEA 3.30pm-3.45pm		
3:45 -4.15pm	Role of Biostatistics in Biosafety evaluation	Mr. K. Venkaiah, Scientist 'E' ✓
4.15- 4.30pm	Interactions	Faculty and Participants

分為A、B、C三組參觀


印度國家營養研究所之參觀流程

1. 被參訪的各實驗室主持人簡介其研究工作
(10-15分鐘)
2. 分組參訪重要實驗室
3. 圖書館介紹

抗氧化方面的研究




國家動物試驗中心



NATIONAL INSTITUTE OF NUTRITION, Hyderabad, INDIA.
राष्ट्रीय पोषण संस्थान, हैदराबाद, भारत.

National Centre for Laboratory Animal Sciences (NCLAS)



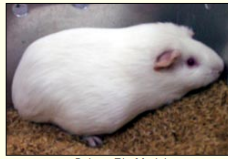
The Evolution

The National Centre for Laboratory Animal Sciences was set up with the aim of producing quality laboratory animals for experimental purposes. The centre was known as the Laboratory Animals Information Service (LAIS) prior to 1976, had its modest beginning in 1957 in Bombay, with the financial support from UNESCO.

In 1959, the Centre was taken over by ICMR and later in 1976, it was shifted to the premises of National Institute of Nutrition (NIN), Hyderabad. At this juncture, the Centre was renamed as Laboratory Animal Information Service Centre (LAISC). It expanded its activities and started breeding and supplying laboratory animals to various Institutions in the country. In 1988 with the financial support from ICMR and Department of Biotechnology, the services of LAISC were considerably improved through the establishment of a National Infrastructure Facility for Laboratory Animals (NIFLA). In the year 1995, the two centres, viz., LAISC and NIFLA were merged into a single unit and re-christened as the National Centre for Laboratory Animal Sciences (NCLAS). The center is currently meeting the breeding and experimentation needs of over 180 institutions in the country. Apart from breeding and supplying of animals, the center regularly undertakes quality control of laboratory animal feed and checks the health and genetic background of laboratory animals under its care.

Objectives

1. To breed and supply genetically and microbiologically defined laboratory animals
2. To import and supply selected strains of laboratory animals for biomedical research
3. Development of natural mutants for study of human diseases
4. Conducting research in laboratory animal sciences
5. Human resource development by organizing regular training courses
6. To disseminate information through Information-Education-Communication
7. To serve as a national reference centre and nodal agency on matters related to laboratory animal science and technology.

Guinea Pig Model

參觀時不可拍照

包括、豬、狗、猴子等試驗動物

動物試驗中心參觀

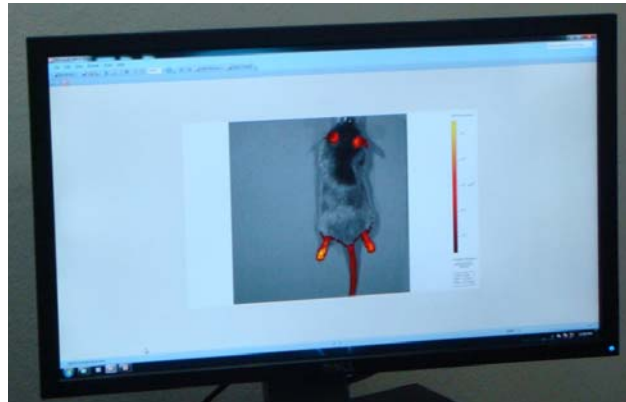


Parameters/Score	Scoring Sheet				
	1	2	3	4	5
Live Phase of Animal (Sex, Age, Food intake)	Normal	Normal	Normal	Normal	Normal
Body weight	Decreased	Normal	Increased	Increased	Increased
Cage Size Observations	Normal	Normal	Normal	Normal	Normal
Posture	Normal	Normal	Normal	Normal	Normal
Facies	Normal	Normal	Normal	Normal	Normal
Urine colour	Normal	Normal	Normal	Normal	Normal
Behaviour while removed from the cage	Normal	Normal	Normal	Normal	Normal
Physical Examination	Normal	Normal	Normal	Normal	Normal
Respiratory rate (by observation)	Normal	Normal	Normal	Normal	Normal
Respiratory character	Normal	Normal	Normal	Normal	Normal
Lacrimation	Normal	Normal	Normal	Normal	Normal
Salivation	Normal	Normal	Normal	Normal	Normal
Eye lids closure	Normal	Normal	Normal	Normal	Normal
Eye lids open	Normal	Normal	Normal	Normal	Normal
Eye Prominence	Normal	Normal	Normal	Normal	Normal
Convulsion	Normal	Normal	Normal	Normal	Normal
Biting behaviour	Normal	Normal	Normal	Normal	Normal
Tremors	Normal	Normal	Normal	Normal	Normal

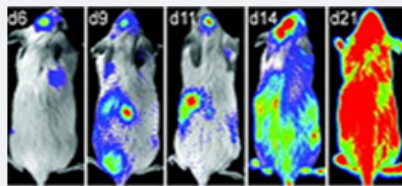
Pre-clinical Toxicology, NIN, Hyderabad Page No: 7

飼料製備廠

In vivo biophotonic imaging technology



Department of Pediatrics Small Animal Bioimaging Core Facility



The Department of Pediatrics Small Animal Bioimaging Core Facility is located in a 230 square foot dedicated space located in the basement of the Basic Science Building within the NYMC Animal

Facility. This core provides quantitative fluorescence and bioluminescence imaging services for the in-vivo and in-vitro study of small animals and specimens. The tracking of cell populations in vivo, as in animal models, is essential for sophisticated studies, especially stem cell and cancer biology research. The fate and differentiation of cells derived from transplanted stem cells, for instance, can be non-invasively followed in-vivo using bioluminescent or fluorescent tags



monitored by a camera. The facility's dedicated imaging instrument is the Xenogen In-vivo Imaging System (IVIS) SPECTRUM™ from Caliper Life Sciences which is a in-vivo biophotonic imaging technology to facilitate exploration of gene expression, cell trafficking, pathogens and tumors or disease progression in living animals. It possesses multimodal imaging which provides both quantitative bioluminescence and fluorescence

imaging for up to 4 mice or 2 medium rats. It can also accommodate petri dishes or microtiter plates for in-vitro imaging. This system includes a highly sensitive CCD camera,

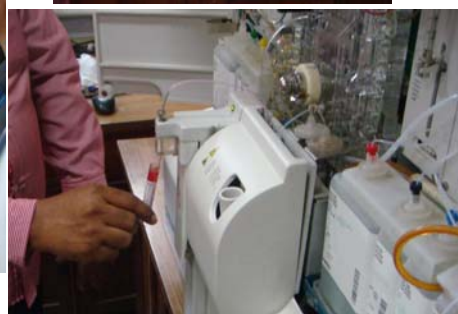
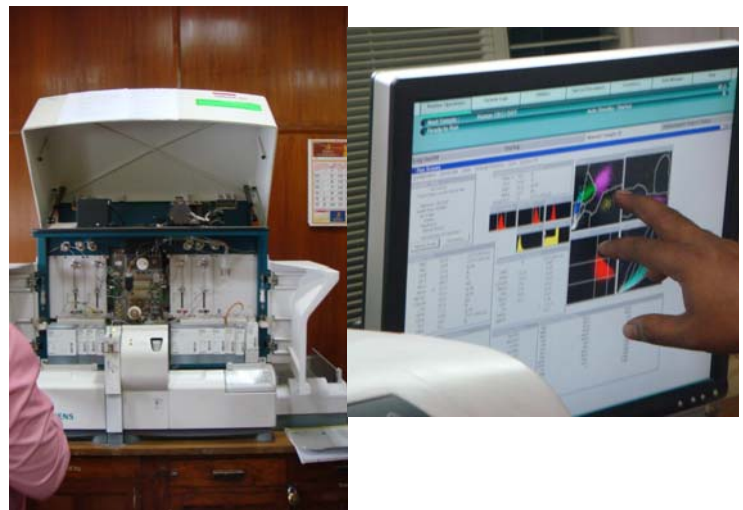
pepsin digestibility assay 對轉基因植物評估的重要性



SDS-PAGE gel preparation
Resolving gel

S.No.	Reagent	8%	10% (5ml)	12%
1.	Ddw	2.3ml	1.9ml	1.6ml
2.	30% acrylamide mix	1.3ml	1.7ml	2.0ml
3.	1.5M Tris pH8.8	1.3ml	1.3ml	1.3ml
4.	10%SDS	0.05ml	0.05ml	0.05ml
5.	10%APS	0.05ml	0.05ml	0.05ml
6.	TEMED (Add last)	0.003ml	0.002ml	0.005ml

動物毒理試驗血液分析及切片觀察



組織病理學分析儀

操作半自動切片機及切片自動染色儀



手動組織切片觀察



細胞免疫分析實驗室

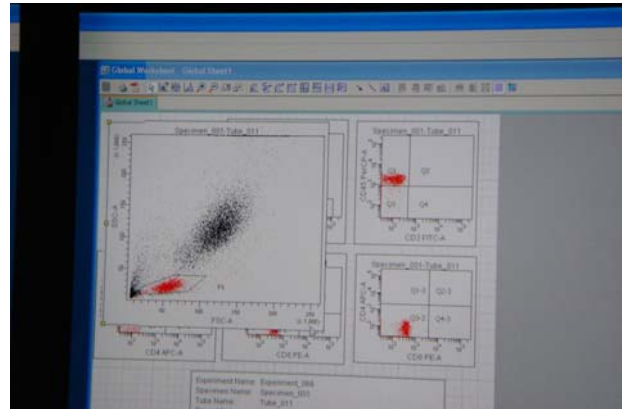


AB-QPCR

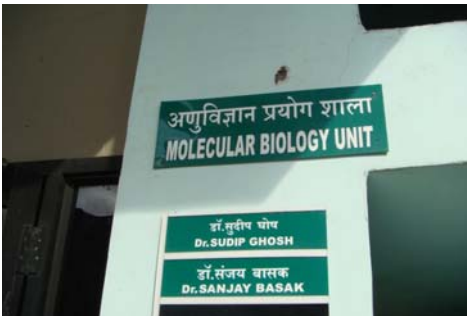
細胞培養室



流式細胞儀

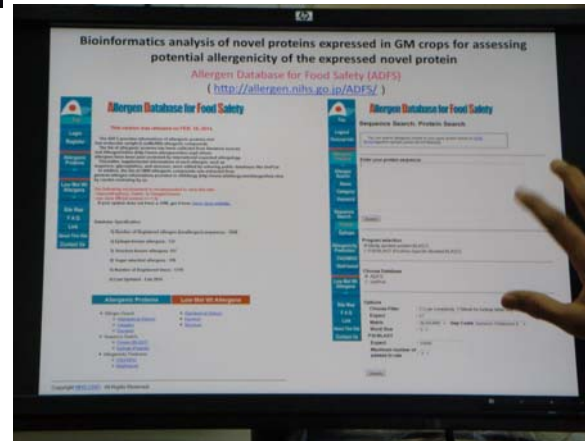
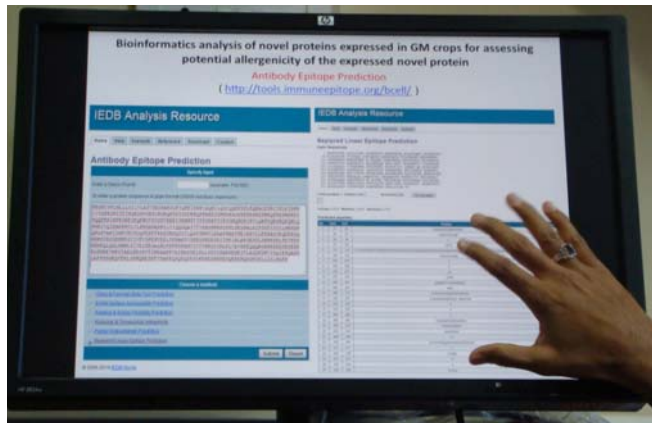
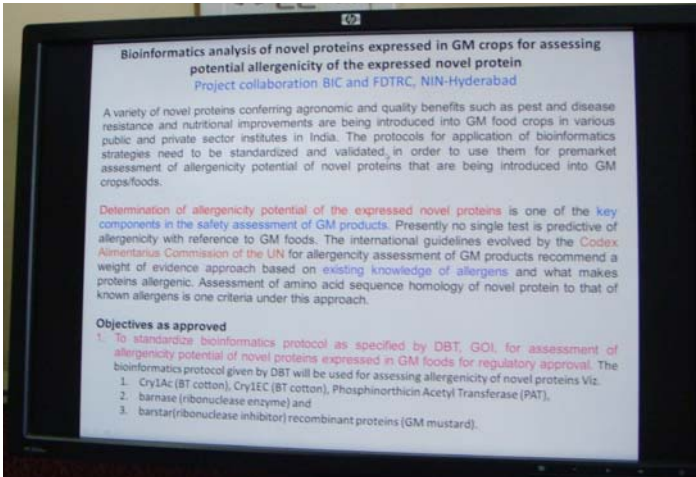


分子生物學研究室



PCR、蛋白質分離儀、操作GMO的分析、real-time PCR、膠片照相設施、螢光顯微鏡等。

過敏源的相關基因和蛋白質資料庫



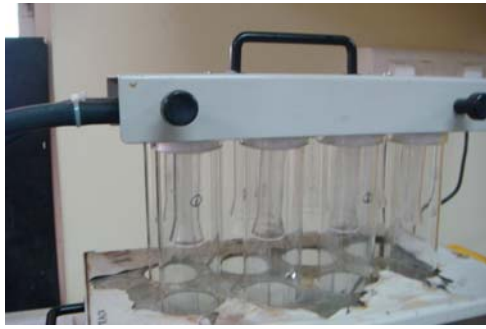
營養成分的分析

Day 12 (12 September 2014 | Friday)

Session: 10 NPK Lab, AIP	
0900 – 1600	Hands-on training on nutritional analysis
1030 – 1045	Tea
1230 – 1330	Lunch
1545 – 1600	Tea
About the session	Participants will be trained on proximate analysis – Protein, Fat, Moisture, Ash content, Fiber, and Carbohydrate – of food samples.
Trainers	Dr. Saikat DattaMazumdar, COO, NPK Program, AIP, ICRISAT Ms. Priyanka Durgalla, Scientific Officer, NPK Program, AIP, ICRISAT

和儀器業者合作

脂肪及蛋白質含量檢測



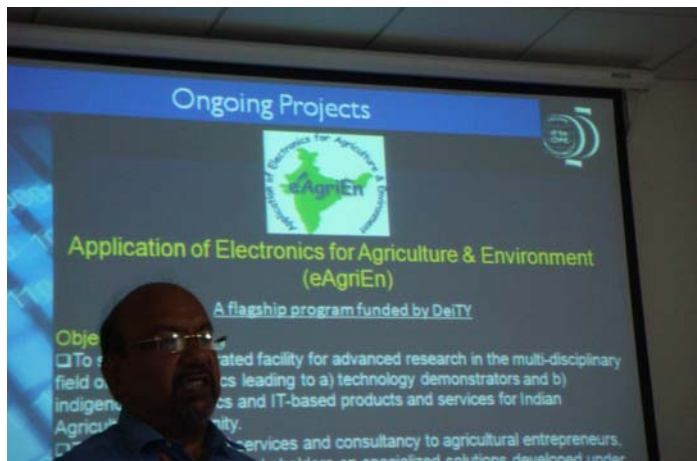
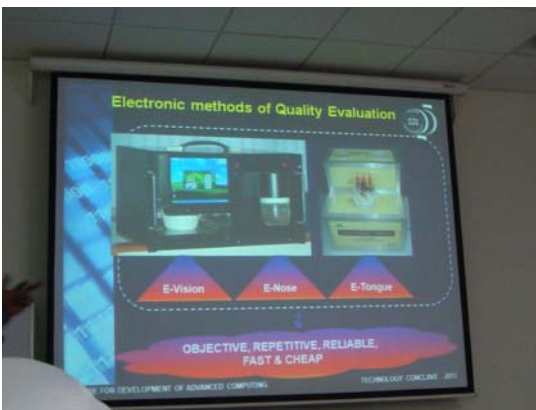
凱氏氮法測定蛋白質含量



索式萃取法測脂肪含量



電子感應儀器在農業上的應用



米粒外觀品質的分析



C-BAC, Kolkata
The 22, Back of James T
Kolkata, India 71
South 247 009

Rice Quality Analysis Report

Station: Rice Grain: 44

RICE BY SIZE: %		RICE BY SIZE: %		RICE BY SIZE: %	
1 BROKEN	2 EXTRA LONG	3 MEDIUM	4 LONG	5 OTHERS	6 SELL
27.13	30.00	30.00	1.35	0.00	0.00

RICE BY SHAPE: %		RICE BY SHAPE: %		RICE BY SHAPE: %	
1 BROWN	2 OTHERS	3 MEDIUM	4 LONG	5 OTHERS	6 SELL
0.00	0.00	0.00	0.00	0.00	0.00



ANALYSIS OF RICE

Size of RICE: 00

Size & Estimation of Rice (in mm)

Max Length	Min Length	Max Breadth	Min Breadth	Max Per	Min Per
2.22	1.714	1.202	0.822	20.391	14.910

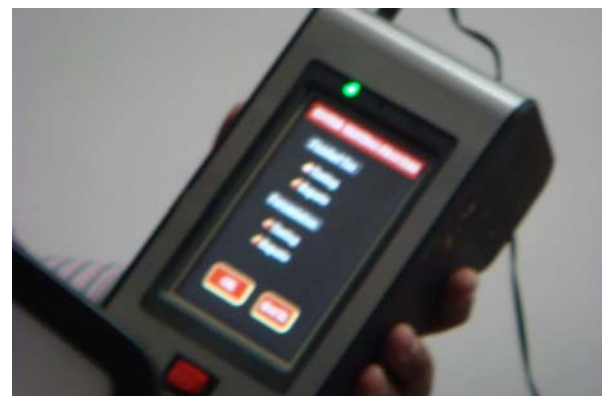
Type of Rice

Size	Number	%	Size	Number	%
1	1176	0.00	11	7200	0.00
2	8618	2.28	12	742	0.01
3	1.34	0.00	13	8262	0.00
4	1.47	0.00	14	1318	0.03
5	800	0.02	15	2018	0.05
6	1785	0.04	16	7187	0.18
7	1785	0.04	17	7187	0.18
8	1785	0.04	18	7187	0.18
9	1785	0.04	19	7187	0.18
10	1785	0.04	20	7187	0.18
11	1785	0.04	21	7187	0.18
12	1785	0.04	22	7187	0.18
13	1785	0.04	23	7187	0.18
14	1785	0.04	24	7187	0.18
15	1785	0.04	25	7187	0.18
16	1785	0.04	26	7187	0.18
17	1785	0.04	27	7187	0.18
18	1785	0.04	28	7187	0.18
19	1785	0.04	29	7187	0.18
20	1785	0.04	30	7187	0.18

Rice Variety: Pusa Esamand
Broken Rice: Number: 12 17.85 %

Annadarpan Ver 1.0 - a rice quality analyzer

電子鼻在茶葉品質評估的應用



ICRISAT國際傑出女性農友日



表揚印度傑出女性農友

閉幕及頒發受訓證書

Day 13 (13 September 2014) Saturday

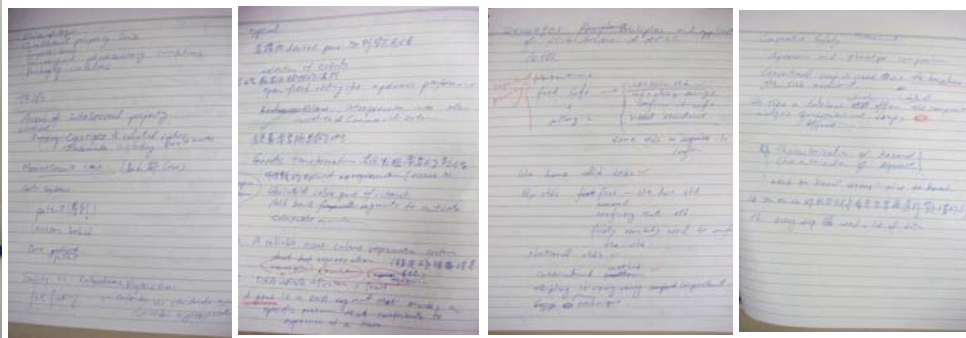
Session: 11	PTTC
1000 – 1200	Valedictory Program 告別
1000 – 1030	Tea and Snacks
1030 – 1040	Welcome address by Dr. Kiran K. Sharma, CEO, AIP, ICRISAT
1040 – 1050	Program highlights by Dr. Saikat DattaMazumdar, COO, NPK Program, AIP, ICRISAT
1050 – 1100	Address by Dr. StefaniaGrando , Director Research Program-Dryland Cereals
1100 – 1110	Address by Dr. Rajeev Vashney, Director Research Program-Grain Legumes
1110 – 1120	Presentation of certificates to participants
1120 – 1140	Feedback from participants



閉幕典禮

亞洲區和非洲區學員
代表回饋致詞

結訓領證書



心得與建議

1. 參與國學員多為政府單位所屬機構以及國立大學的研究人員，但除東南亞國家外，其他國家對我國整體狀況並不熟悉，因此，在本次訓練過程中，找機會向參與成員介紹我國農產品的多重農藥殘留分析技術、農藥殘留的田間監測工作及簡介我國農委會和本所的業務等，讓學員能瞭解我國在農業及其他方面的進步。
2. 包括主辦國印度及其他各參與國的檢驗技術、儀器設備及分析能力皆不及我國，就技術能力面及訓練環境而言，我國比印度更具有主辦類似國際訓練課程的能力，只是舉辦國際訓練課程所費不貲，需要有類似APAARI等國際組織的經費支援，否則對主辦單位會是一種負擔

心得與建議

3. 關於轉基因作物的生物安全相關法規，我國與世界各國同步，強調轉基因的生物安全評估應建立科學數據為基礎，而轉基因作物的推廣對飢餓和貧窮的國家是很重要的。台灣仍不可種植轉基因作物，就種植轉基因作物的經驗印度國比我國豐富，可做為參考。
4. 本所在農產品農藥殘留、重金屬檢驗分析已取得ISO 17025的認證，可檢驗之農藥殘留品項達400種；另有16項的動物毒理試驗也獲得認可，不論人力資或儀器設備具執行基因轉殖產品安全性評估的能力。
5. 此次參與國際訓練計畫，主辦單位對學員背景的瞭解及受訓心得的回饋相當關心，而對學員交通、住宿及飲食安全也相當注意，可作為爾後主辦類似活動時的經驗參考。

以上報告 謝謝聆聽