Agricultural Practices
Critical Factors in Food Safety

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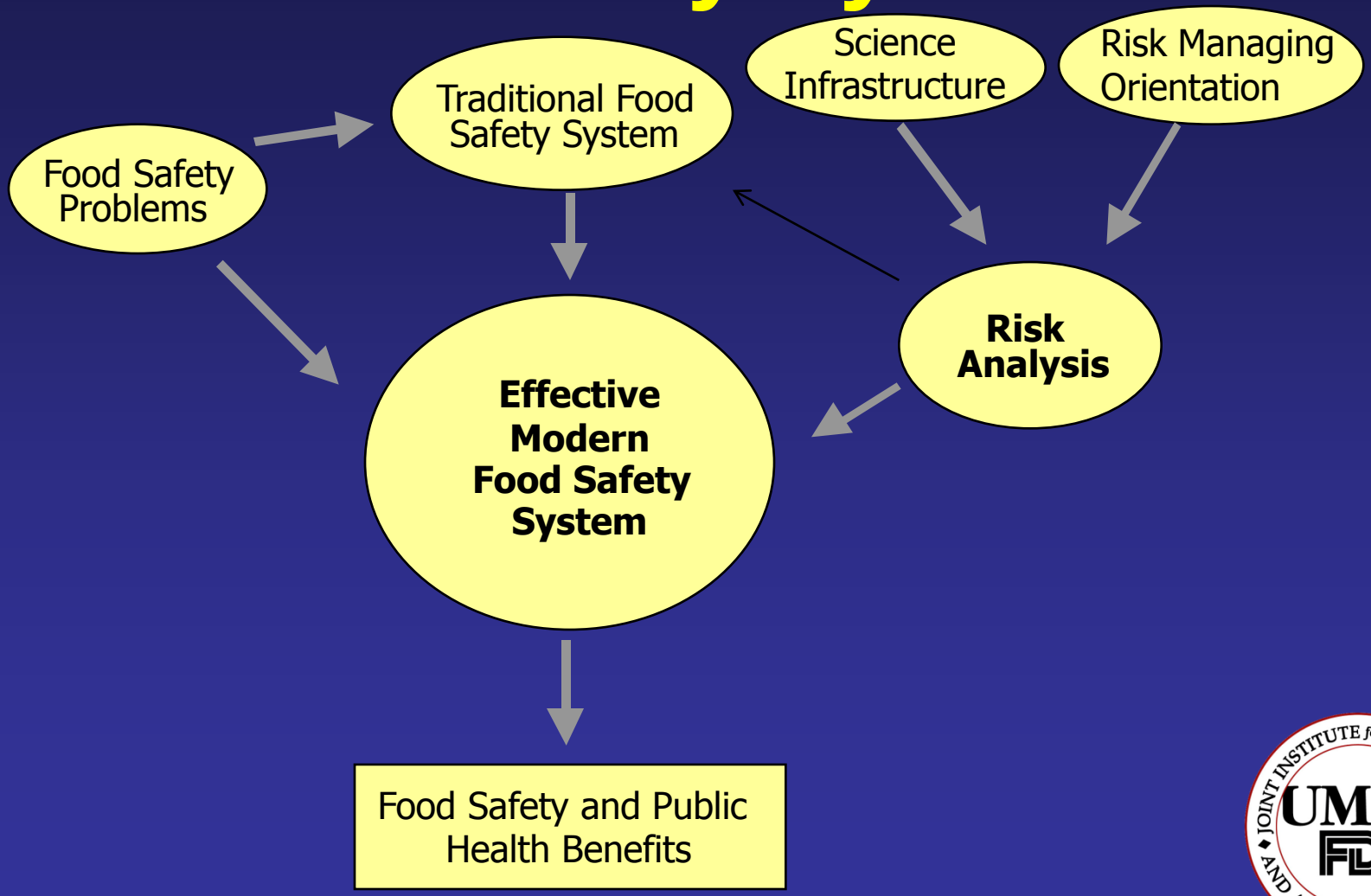
World Spice Congress 2014
February 16-19, 2014
Cochin, India

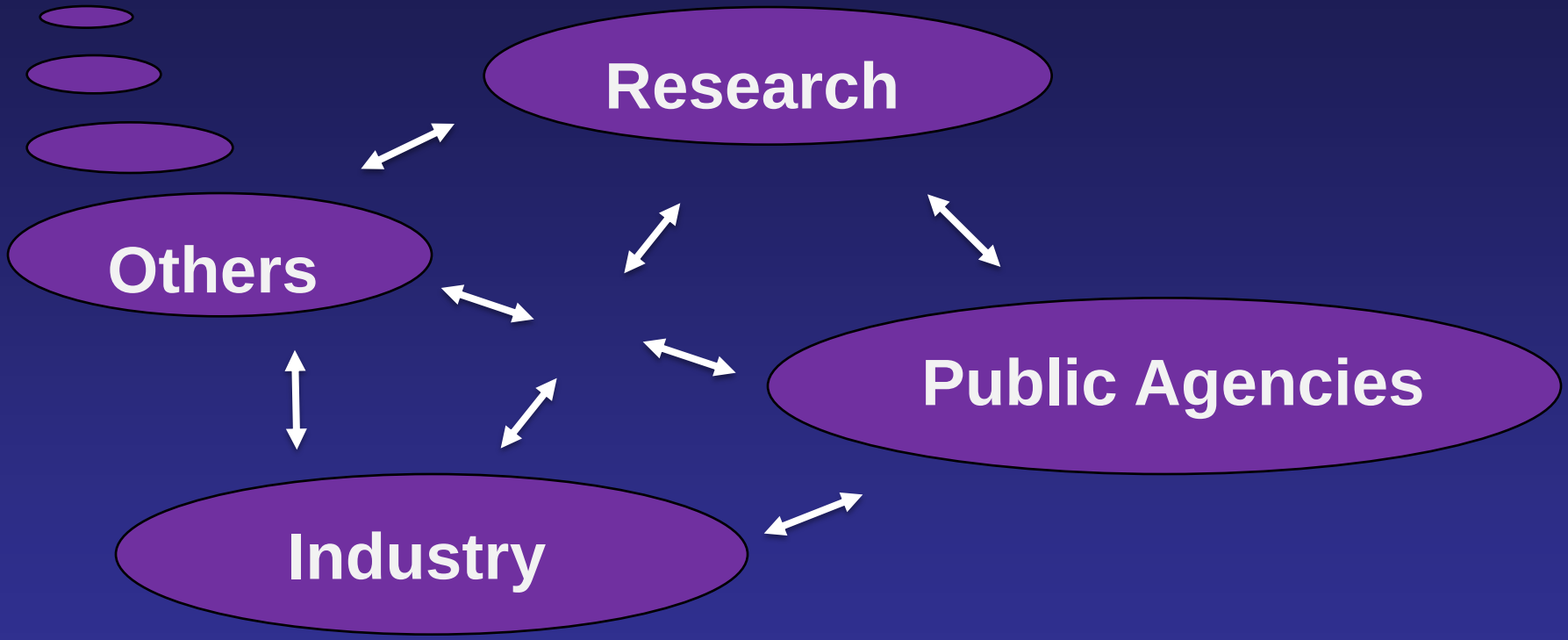
Consumption of unsafe food continue to be one of the major causes of preventable malnutrition, disease, and death

- 1.7 million deaths and 54.2 million Disability Adjusted Life Years lost annually due to unsafe water, lack of hygiene and insufficient sanitation (WHO)
- 3 to 3.5 million ha. of agricultural land in developing countries are being irrigated with raw or diluted wastewater (IWMI)
- Over 4.5 billion people are chronically exposed to toxic fungi in staple crops which may cause cancers, liver diseases and stunted growth in children (CDC)

Science-Based Food Safety System



Need Engaging Research to Meet Industry Challenges



Food Safety is Everyone's Responsibility!

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Rich History of Collaboration

Anonymous. 1900. Typhoid fever caused by celery. Journal of Mental Science. Volume 48: 616-617.

Outbreak of illness (typhoid fever) – 40+ victims

Public Health Authorities Investigation

Epidemiological - Consumption of contaminated celery by all victims
Environmental
- **Soil contaminated by sewage**
- **Sewage contained human pathogens**
- **Pathogens contact plants and survive**

Transfer of pathogen within the plant? This question is still relevant today.

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115 Years Later – U.S.A.

115 Years Later - India


Modern Composting Practice
Automated, Monitored, Tested, Validated

Heat Treatment of Organic Fertilizer

An effective sanitizing method used for pelletized chicken manure

Cost my be higher than composting

Photo is not a product endorsement

Heavily Contaminated Surface Water

Portable Water Treatment Unit that filters water to make it usable

Large Scale Chlorine Dioxide Treatment of Surface Water Moving through canals in Mexico

Risk areas for agricultural practices have been defined by various authorities, for example……

US-FDA. 1998. Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables
http://www.fda.gov/downloads/food/guidancecomplianceregulatoryinformation/guidancedocuments/produceandplanproducts/ucm169112.pdf

- **Water – Agricultural and Processing**
- **Manure and Municipal Bio-solids**
- **Worker Health and Hygiene**
- **Sanitary Facilities**
- **Field Sanitation**
- **Packing Facility Sanitation**
- **Transportation**

Good Agricultural Practices training programs designed to address these areas

US–FDA. 2013. Draft Risk Profile: Pathogens and Filth in Spices

http://www.fda.gov/downloads/Food/FoodScienceResearch/RiskSafetyAssessment/UCM367337.pdf

Most up-to-date source of food safety information for spices

Anyone interested in spices a must read

Findings

>20,000 food shipments nearly 7% of spice lots contaminated with salmonella (an avg twice the amount of other foods)

- **15% of coriander**
- **12% oregano & basil**
- **4% black pepper**

1.2 million people in US annually sicken with salmonella

- **More than 23,000 hospitalized; 450 die**
- **Symptoms include diarrhea, fever, abdominal cramps, infection can last 3-5 day and possible death**

Worldwide lack of good surveillance data on level of contamination and associated illness/death

Governments worldwide moving toward science based approaches to reduce such risk

- Risk is everywhere
- Some risks are more serious than others
- Zero risk is not an option
- Risk is unavoidable

- So what is the risk profile of spices as management options should be science based

Integration of Spice Food Safety Management with Modern Agricultural Practices

Data Gaps and Research Needs

Industry
Modern Agricultural Practices
Research Community
Food Safety

Data Gaps and Research Needs Regarding Foodborne Outbreaks (people getting sick)

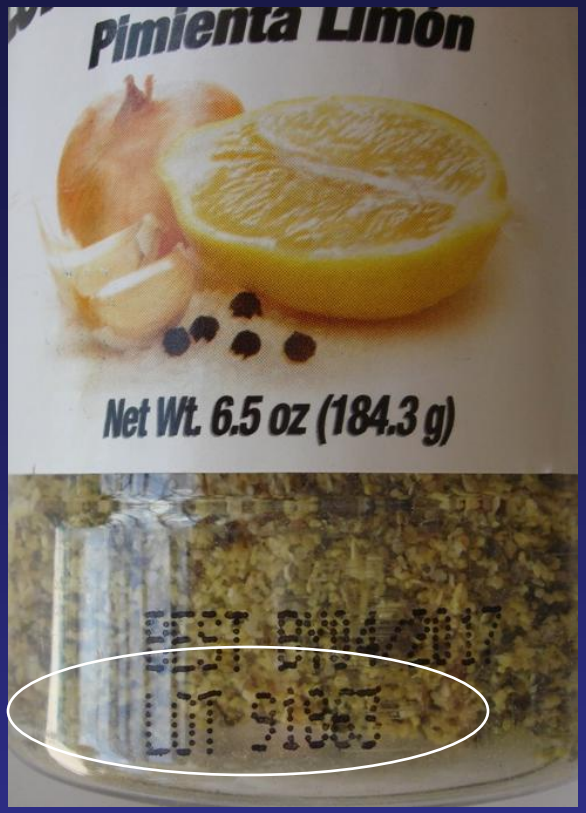
What else is missing?
Prevalence and Concentration…Pathogens/Filth

- Determine the distribution and concentration of *Salmonella* and other pathogens and filth in the farm-to-table continuum
- Characterize cross-contamination potential from the processing environment to the spice product
- Identify firms that conduct pathogen reduction steps and environmental testing (preventative controls)
- Understand differences between small and large scale farmers

Traceback

- Big issue in trade (international and domestic)
- Ability to traceback essential for limiting illness during an outbreak and avoiding reoccurrence after an outbreak

Seasonings from the Home Cabinet

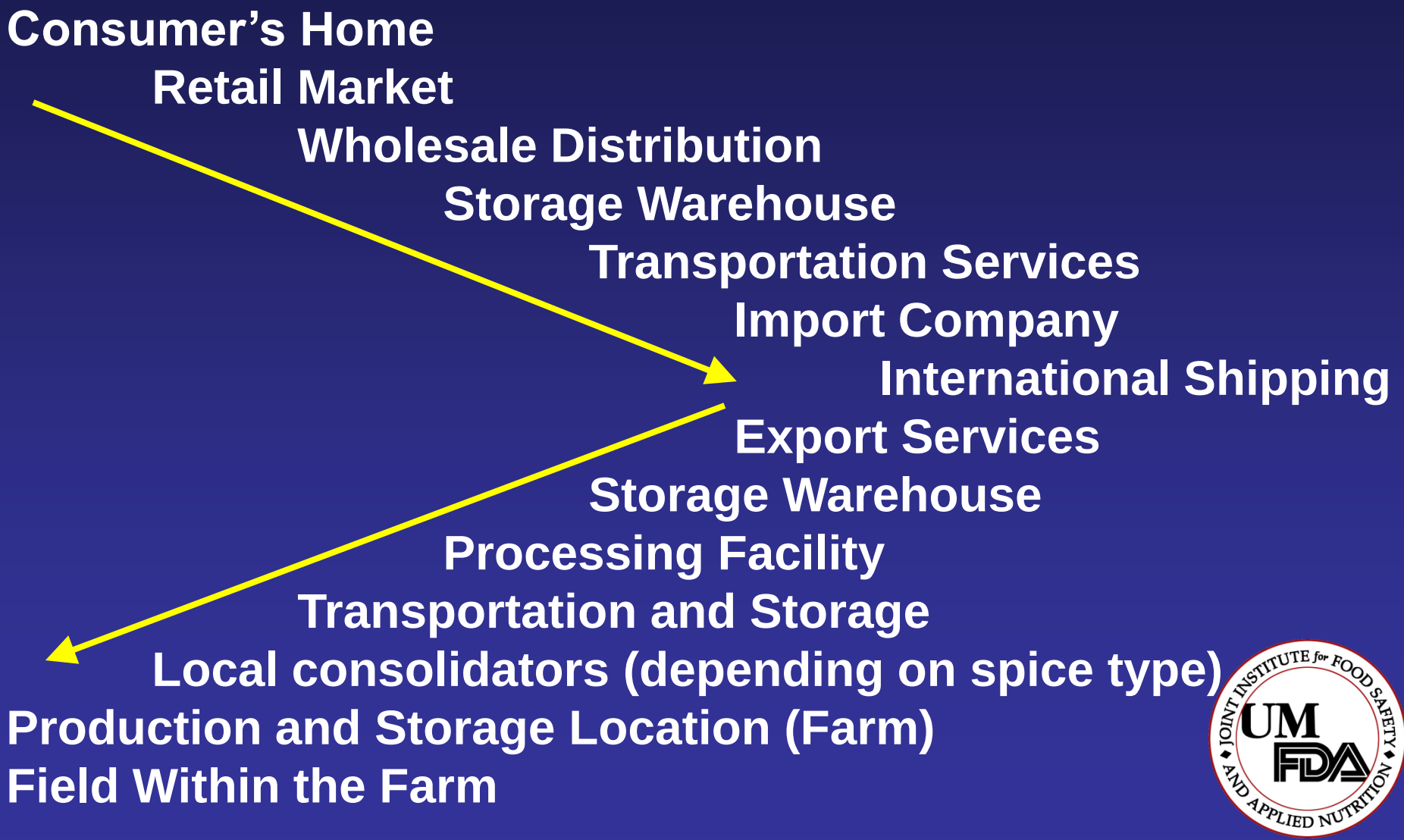


Product from Chile Identified

Sources of Other Products Unidentified

Black Pepper Has No Lot Code

Tracking the Movement of Spices in the Supply Chain and Associated Risks




Spices Farmer
His product goes to a consolidator…
How does one identify his product
Once it leaves his farm?

Data Gaps and Research Needs

Foodborne Outbreaks

Research novel methods/ strategies to efficiently:

- **Identify the contaminated ingredient in foodborne illness outbreaks**
- **Identify the root cause in a foodborne outbreak involving spices**
- **Traceback spice ingredients to their original source**

Data Gaps and Research Needs

What are the Characteristics of Contaminants?

Focus on *Salmonella* – how does it survive and grow

- **Determine if spice type influences survival of *Salmonella* in dry product and its growth in moist product**
- **Determine if *Salmonella* survival in spices is strongly dependent on the numbers/concentration introduced**
- **Determine survival and potential for growth of other pathogens in spices**

Are there other pathogens of concern?

Data Gaps and Research Needs

Mitigation and Control Options

- Identify surrogate microorganisms for *Salmonella* for use in mitigation studies
- Efficacy of spice reduction processes and validation of mitigation treatments
- New / improved methods of dry cleaning and sanitation that are effective against pathogens (validation)
- Determine costs (economic, social, consumer) of pathogen and filth reduction treatment for all spices

Research Needs

Mitigation and Control Options

More an issue of processing than production however some farmers may implement on-farm strategies

- **Rapid and accurate method(s) to measure mold and screen and/or quantify filth in spices**
- **Optimize methods for detection and enumeration of pathogens**
- **Determine metrics to assess effectiveness of mitigation treatments on reduction of public health risk...ie does it work?**

Research Needs

Consumption- far from agricultural production

- Determine the fraction and type of spices consumed that had never received a pathogen reduction step (including cooking)
- Determine the distribution and variability of spice consumption among general and susceptible populations
- Determine the fraction and type of spices eaten raw
- Conduct exposure assessments associated with analysis

Education and Training

Every individual in the spices industry must be trained in food safety

All others associated with the industry should be trained

Collaborative Training Center

Supply Chain Management for Spices and Botanical Ingredients

JIFSAN-Spice Board, CII-FACE

Established in September, 2012

THE TIMES OF INDIA

Spices Board sets up training centre

TIMES NEWS NETWORK

Kochi: The Spices Board has set up a collaborative training centre for food safety and supply chain management, in association with the Confederation of Indian Industry (CII) and the US Food and Drug Administration (USFDA). The centre will help ensure the quality of spices exported from the country.

Spices Board chairman Dr A Jayathilak inaugurated the phase one of the centre in Kochi on Monday. "It is the culmination of the decision taken at the World Spice Congress held in Pune in February this year," he said.

The centre will facilitate capacity building and developing product specific testing procedures in the sector of spices and botanical ingredients. Jubilant Bhartia Food and Agriculture Centre of Excellence (CII-FACE) and The Joint Institute for Food Safety and Applied Nutrition (JIFSAN) will collaborate with the Board for the further development of the centre. JIFSAN is an institute set up jointly by the US food and medicine safety watchdog and the University of Maryland.

Spices Board chairman A Jayathilak handing over the memorandum of understanding to James Wayne Rushing, manager for International Training Programme, JIFSAN, in Kochi on Monday. Indrani Ghose, principal counsellor, Confederation of Indian Industry, is also seen

Dr Jayathilak has signed a memorandum of understanding (MoU) with Sujith Haridas, regional head for south, CII, Indrani Ghose, principal counsellor, CII, and James Wayne Rushing, manager for international training programme, JIFSAN.

Delegates from various parts of the world will lead deliberations in a five-day training programme in Kochi. In the second phase of the programme, selected delegates will get two weeks' training in the US. In phase three, participants would get involved in a series of workshop and training programmes in different regions of India.

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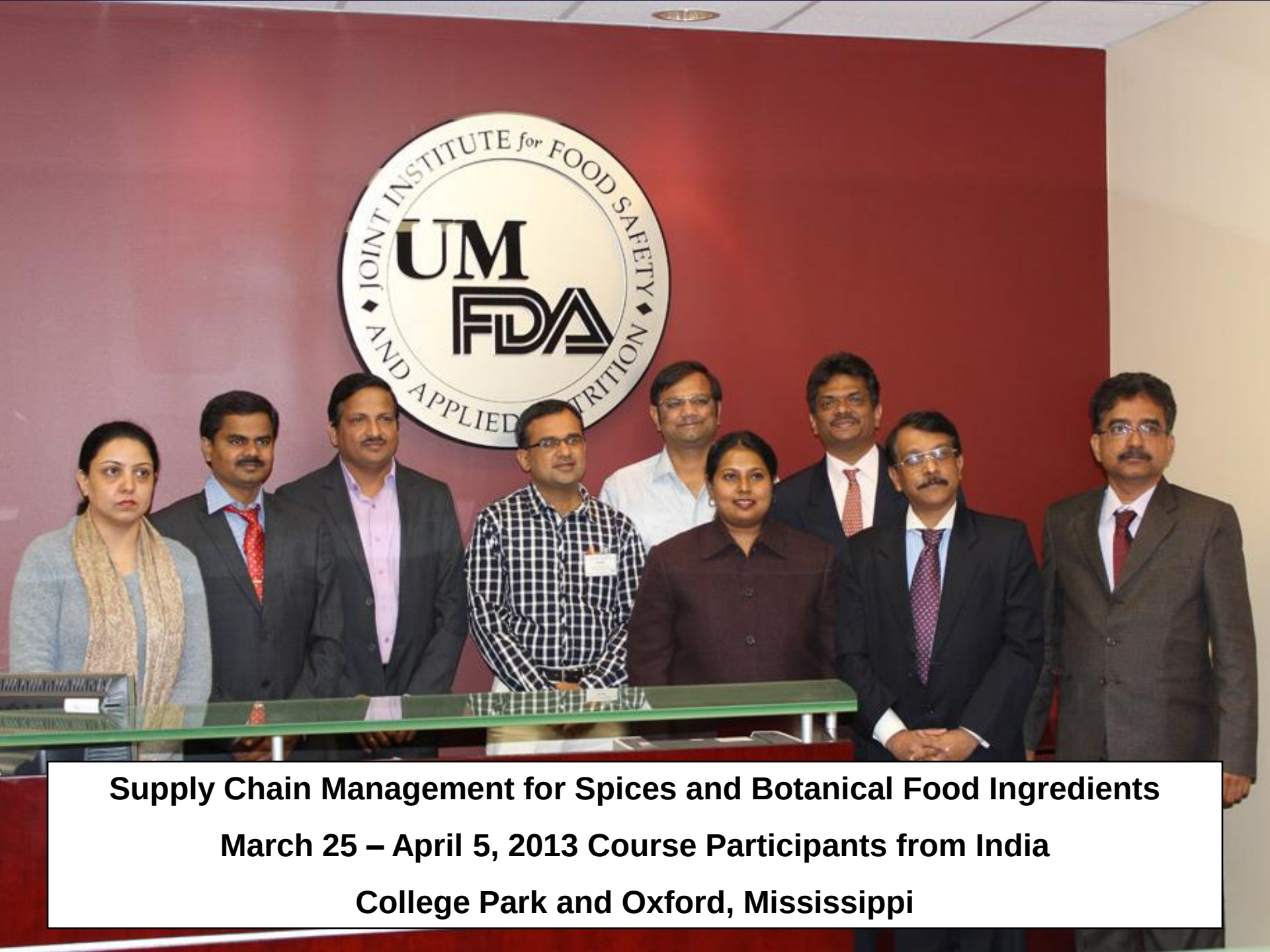
Supply Chain Management for Spices and Botanical Ingredients

Kochi, Kerala, India – September 17-21, 2012



Supply Chain Management for Spices and Botanical Food Ingredients

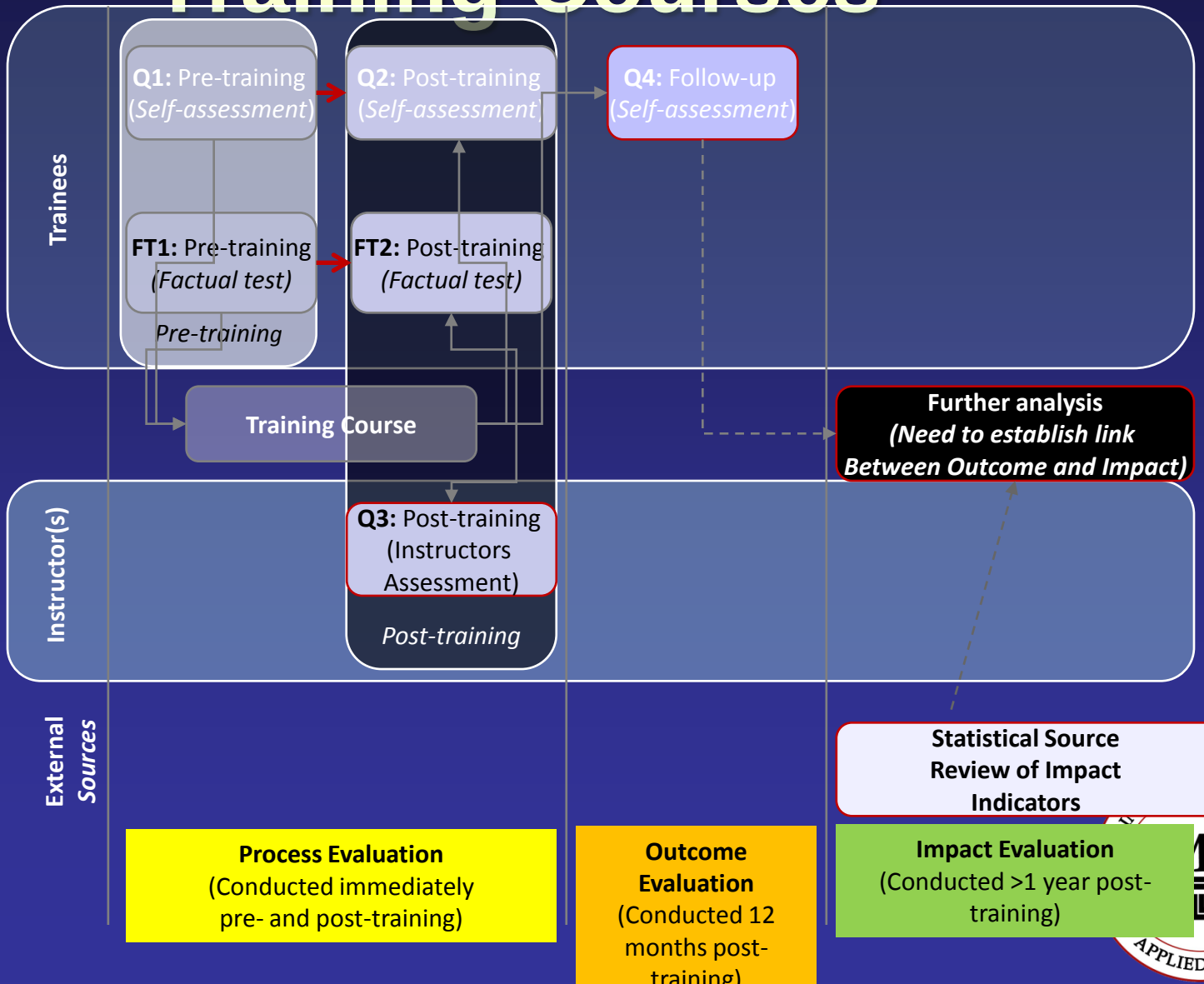
March 25 – April 5, 2013 Course Participants from India

College Park and Oxford, Mississippi

Phase-III follow-up

- 3 Trainer's Training programs held between September and October 2013
- CII-Face responsible for organizing training programs for the industry
  - Training will be delivered jointly with trained personnel of CTC
- We will be having discussions on this during the week
- Discussing best monitoring and evaluation approach to evaluating impact of trainings

Evaluating the Effectiveness of Training Courses



Small-scale farmers

- Interested in outcomes in terms of improve livelihoods and health indicators
- Phase III starting to reach out to small scale producers
- Discussions this week on M&E approaches

Working Together to Make Food Safe

Change is Slow in Agriculture

Usually it is Business that Drives Change

Food Safety is Good for Business


Thank You !