



Food and Agriculture  
Organization of the  
United Nations

World Banana Forum (WBF)  
*Working Group 01 on Sustainable Production and Environmental Impact*

## WEBINAR

### Maximum Residue Levels: Regulations, Impacts and Opportunities for Sustainable Banana Production and Trade

20 July 2023

#### Moderator:

**Victor Prada**, Secretary General of the World Banana Forum Secretariat (WBF), Food and Agriculture Organization of the United Nations (FAO)

#### Panellists:

**Guibiao Ye**, Agricultural Officer and Secretary of the Joint FAO/WHO Meeting on Pesticide Residues (JMPR) and the Joint Meeting on Pesticide Application (JMPS), Joint FAO/WHO Expert Committee on Pesticide Residues, Food and Agriculture Organization of the United Nations (FAO)

**Sergio Laprade**, Environmental and Social Responsibility Coordinator, The National Banana Corporation of Costa Rica, Costa Rica

**Fazil Dusunceli**, Agricultural Officer, Plant Production and Protection Division, Food and Agriculture Organization of the United Nations (FAO)


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#### 1. Opening Remarks

On behalf of the **World Banana Forum (WBF) Secretariat**, hosted by the **Food and Agriculture Organization of the United Nations (FAO)**, **Mr Victor Prada, FAO**, welcomed all participants to the webinar on “Maximum Residue Levels – Regulations, Impacts and Opportunities for Sustainable Banana Production and Trade”, coordinated by the Working Group 01 of the WBF Secretariat.

#### 2. Overview of the status of MRLs for bananas and current trends regarding pesticide residues and trade implications

**Mr Guibiao Ye, Joint Meeting on Pesticide Residues (JMPR) Secretariat/FAO**, started his presentation by providing an overview of pesticide residue and Maximum Residue Levels (MRLs), their establishment processes, and the current status of Codex MRLs ([CXLs](#)) for pesticides in banana, along with their implications for trade.




FAO estimates indicate the need for agricultural production to increase by approximately 60 percent by 2050 in order to feed a growing world population. However, plant pests and diseases result in the loss of up to 40 percent of food crops worldwide, along with associated food trade losses which account for USD 220 billion annually. In this context, pesticides have proven to be one of the most effective and cost-efficient means of safeguarding crops. This is particularly true for bananas which are cultivated in monoculture plantations, making them particularly susceptible to pests and diseases in the absence of plant protection products. It has been estimated that banana production demands significantly more pesticides than what is required for other crops.

**Mr Ye** mentioned that the [Procedural Manual of Codex Alimentarius Commission](#) defines pesticide residue as any specified substance in food, agricultural commodities, or animal feed resulting from the use of pesticides. The term includes any derivatives of pesticides, such as conversion products, metabolite's reaction products, and impurities considered to be of toxicological significance. It also includes residues from unknown sources, i.e. background residues, as well as those from known uses of the chemical in question. **Mr Ye** then added that the Codex definition of Maximum Limit for Pesticide Residue is the maximum concentration of pesticide residues (expressed in mg/kg) recommended by the Codex Alimentarius Commission and legally permitted in or on food commodities and animal feeds. On the other hand, MRLs are based on Good Agricultural Practice (GAP) data, hence any foodstuff that complies with the respective MRLs is considered toxicologically acceptable.

CXLs are primarily aimed at protecting the health of consumers and they are also useful in the context of international trade. They are derived from estimations made by JMPR following toxicological assessments of pesticides and residues as well as a review of residue data from supervised trials and uses. This includes GAP at a national level. **Mr Ye** added that in order to accommodate variations in national pest control requirements, Codex MRLs take as reference the higher levels determined during the supervised trials, which represent effective pest control practices. In addition, the examination of dietary residue estimates and determinations conducted both nationally and internationally, in relation to the Acceptable Daily Intake (ADI) and Acute Reference Dose (ARfD), should demonstrate that foods complying with Codex MRLs can be considered safe for human consumption. MRLs are applicable to the final product when it is first commercialized while for commodities participating in international trade, the MRL is applicable at the country's point of entry and before processing.

**Mr Ye** proceeded to elaborate on the process of establishing MRLs. He introduced the JMPR, an expert ad hoc body administered jointly by FAO and the World Health Organization (WHO) whose goal is to harmonize the requirements and the risk assessment strategy on pesticide residues. Additionally, the JMPR provides independent scientific expert advice to various entities, including the [Codex Alimentarius Commission](#) (CAC), the specialised Committee on Pesticide Residues, FAO, WHO, and Member countries.

**Mr Ye** explained that the WHO Core Assessment Group on Pesticide Residue takes several parameters into consideration including general systemic toxicity, acute toxicity, genotoxicity, carcinogenicity, and reproductive and developmental toxicity, among others. Moreover, there are different types of toxicology evaluation namely acute, sub-chronic and carcinogenic/teratogenic evaluations. These types are grouped into two main categories of evaluations: toxicokinetic and toxicological. These groups can be classified as ADI, which has no observed adverse effect level/safe factor ( $\geq 100$ ), or as ARfD with a safety factor of  $\geq 100$ . Additionally, **Mr Ye** elaborated that the Residue Chemistry Evaluation encompasses the examination of residue metabolism in plants, animals, and the environment, employing the residue definition for compliance and dietary assessment. Meanwhile, the Residue Behaviour Evaluation oversees a range of activities, including field residue trials, rotational crop studies, processing studies, feeding trials, and more. The parameters considered in residue evaluations include Supervised Trial Median Residues (SMTR), STMR-P, Highest Residues (HR), and HR-P. **Mr Ye** emphasized that in order to establish Dietary Intake Assessments, it is necessary to conduct evaluations related to residues, environmental factors, and toxicology. By doing so, a short-term or a long-term risk assessment can be completed and MRLs can be recommended by the competent authorities.



**Mr Ye** then provided an update on the current status of CXLs of Pesticides in Banana. Presently, 27 fungicides, 11 insecticides and 6 herbicides are used for the production of tropical and sub-tropical fruits with inedible peel, 10 of which are at or above the limit of determination. Indeed, the determination of MRLs constitutes a major Sanitary and Phytosanitary Measure (SPS) that carries strong implications for trade.

**Mr Ye** discussed the possible alignment of European Union MRLs with CXLs, provided that the EU sets MRLs for the commodities under consideration. Currently, the MRLs set by the European Union are lower than the CXLs. In this regard, the European Union will make reservations about the progress of the proposed Codex MRLs when discussing specific substances in case one or more of the following situations occur: if toxicological data is not available or not yet assessed at the European Union level; if the proposed CXL is not safe for European consumers; if the proposed CXLs are not sufficiently supported by data as required according to FAO manual; and/or if CXL is not acceptable with respect to areas such as supporting data, data extrapolations, as well as global environmental issues (e.g. pollinators decline, accumulation of persistent and toxic substances in the environment)

As a final remark, **Mr Ye** shared the finding from the United States Department of Agriculture (USDA) indicating that peeled bananas tend to be associated with little pesticide residues ([2012 Annual Summary of Pesticide Data Program, USDA](#)). Furthermore, while only a limited number of pesticide applications penetrate the edible tissues of the fruit, they still present hazards to workers and the surrounding environment.


### 3. Impacts of the European Union regulations on MRLs on banana production and trade

**Mr Laprade, CORBANA**, started his presentation by stating that even though less than 1 percent of Costa Rica's territory is dedicated to banana production, the banana sector accounts for more than 40 000 direct jobs and 100 000 indirect jobs. He then added that the Green Deal's main goal is to provide both healthy and affordable food, aligning with the Farm to Fork strategy promoted by the European Union, which aims to reduce the environmental impact of the food industry through regulations on transportation, storage, packing and pesticide residues. More precisely, the Farm to Fork strategy for 2030 intends to reduce chemical pesticide use, nutrient losses and fertilizer usage by 50 percent, 50 percent and 20 percent, respectively. These regulations also apply to products imported to the EU, thus affecting non-European exporting countries. However, **Mr Laprade** mentioned that these regulations might be subject to changes.

He then went on to remark that in the context of [regulation 1107/2009](#) and MRLs, there has been a shift from the concept of *risk* to the concept of *danger*, to define whether or not a substance may or may not be approved. While [regulation 396/2005](#), which sets forth MRLs, does not incorporate the concept of danger, risk assessments are still legally bound to the definition of MRLs. **Mr Laprade** explained that the European Union sets MRLs by default and that the use of several agrochemicals will likely be restricted in the future. Moreover, several molecules have faced limitations in their use over time, and the molecules available in the market are expected to decrease by the year 2025. Regarding the pesticides employed to combat pests and diseases in banana plantations, 54 percent have been discontinued, leaving only 46 percent still accessible for use, posing a serious challenge in the management of pests and diseases within the banana industry. According to **Mr Laprade**, these restrictions have a detrimental effect on the ability to implement Integrated Pest Management (IPM), lead to higher production costs, reduce yields and plantation areas, erode competitiveness, and potentially exacerbate the impact of pathogens. Combined, these effects could compromise food security at a global scale.

**Mr Laprade** added that prohibiting or limiting the use of pesticides can be considered a valid measure if the decision is backed by a science-based risk analysis and the setting of MRLs goes beyond the detection level of the capacity of an analytical equipment.

**Mr Matheus Lima, World Banana Forum (WBF) Secretariat**, asked if there are any ongoing strategies being implemented in Costa Rica with regard to pesticide reduction in banana plantations. **Mr Laprade** conveyed that the



present emphasis is on integrated management, which encompasses the introduction of new banana varieties, the optimisation of pesticide use, and the testing of alternative agrochemicals to replace those that will face restrictions in 2025. **Mr Victor Prada** inquired about the intricacies of the pesticide registration process in Costa Rica. **Mr Laprade** explained that registering a pesticide can take up to 13 years in Costa Rica, while the process is swifter in Brazil where it can be achieved in 7 years. Costa Rica has recently undergone legislative changes and has become a member of the Organization for Economic Co-operation and Development (OECD). This membership has led to the introduction of an equivalence system that has expedited the pesticide registration process, providing the industry with additional tools to manage pests and diseases effectively. However, this new system brings consequences for generic products, which will have to undergo a registration process.


#### 4. Opportunities and alternatives to restricted molecules

**Mr Fazil Dusunceli, Plant Production and Protection Division, FAO**, started his presentation by outlining the vision and approach of FAO regarding IPM. FAO's vision revolves around has four strategic objectives – better production, better nutrition, better environment, and better life – which are all related to plant pests and diseases. In this regard, FAO has structured its efforts into three specific domains, namely (1) pest and pesticide management, including technical support to countries, the development of technical resources and training material for farmers, (2) transboundary plant pests, diseases and emergencies, and (3) international agreements, such as the International Plant Protection Convention (IPPC), Codex, the Rotterdam Convention, the Stockholm Convention and the Code of Conduct on Responsible Use of Pesticides.

**Mr Dusunceli** laid down the major pressing challenges facing modern agriculture with regard to pest control. These include an increased frequency of pest outbreaks, higher damage levels, pests extending their geographical range, and the emergence of and new strains/biotypes. These factors come into play as new banana varieties and pesticides are introduced. Annually, over 1 000 pests collectively contribute to approximately USD 220 billion in losses. Over the last few decades, the occurrence of invasive pests has risen by 40 percent, leading to annual losses of USD 70 billion. Bananas are particularly susceptible to pests and diseases such as Fusarium wilt TR4, Bunchy top virus, banana freckle disease, and many more. **Mr Dusunceli** also commented that with the growing pressure from pests and diseases in recent years, there has been a corresponding rise in pesticide use. In 2022, a total of 2.7 million tonnes of pesticide-active ingredients were applied, with estimates indicating low usage efficiency, ranging from 20 to 60 percent. He acknowledged that pests and diseases should not be treated as separate issues, but rather as components of one ecosystem. Therefore, the environment in which they develop needs to be considered to achieve successful integrated management measures. Together with academia and other United Nations agencies, a framework known as 'One Health' has been formulated, focusing on the interplay of human, animal and ecosystem health in shaping policies and strategies.

**Mr Dusunceli** discussed the development of 'save and grow principles', which aim to increase food production while minimizing resource inputs. Recently, there has been a shift towards the adoption of minimization and optimization strategies in crop production programs, with the goal of reducing potentially harmful inputs like pesticides and plastics in agriculture. These optimization processes are expected to not only save costs but contribute to environmental conservation. Integrated Crop and Pest Management with a preventive focus is crucial, as it can effectively reduce the expenses associated with dealing with phytosanitary issues in the field. This approach relies on agroecological methods that employ environmentally friendly techniques and tools. Thus, in case of pest and disease outbreaks, a responsible and efficient use of pesticides is practiced.

**Mr Dusunceli** clarified that preventive measures can be adopted both at the government and regional level. These measures can be anchored in specific legislation and regulations aimed at curbing the dissemination of plant pests and diseases. Additionally, it is critical to deploy monitoring tools and services, spanning national and regional levels to establish border control points and quarantine procedures and to apply rigorous phytosanitary measures. In developing countries, building stronger seed systems and establishing national preparedness and contingency plans are vital, particularly for crops cultivated in large plantations and that significantly impact local economies like



banana. **Mr. Dusunceli** then provided examples of measures to prevent disease spread in airports, including the display of signs discouraging the introduction of fresh plant material, electronic board warnings and the use of declaration forms for passengers. At the farm level, he detailed the importance of improved farm planning and layouts to mitigate issues like flooding due to irrigation systems. Protective measures like fencing to prevent animal intrusion and the creation of ditches to avert flooding from neighbouring farms, especially in the context of diseases like *Fusarium* wilt TR4 which can be waterborne, are key strategies. This approach involves strategically organizing farms and promoting the use of drip irrigation to reduce the risks of disease transmission.

**Mr Dusunceli** noted that at a farm level, preventing the entry of harmful organisms can be achieved through various measures. These include installing foot baths, restricting access to individuals not involved in farm work, preparing and implementing contingency plans for significant pests and diseases, raising awareness and providing trainings to farm workers, and instituting monitoring programs to enable swift responses. In this context, improved cropping systems encompass practices such as crop diversification, crop rotation/intercropping, selection of resistant and/or tolerant cultivars, and acquiring disease-free planting material.

From an agronomical perspective, a balanced nutrition and improved irrigation systems are key. These systems not only safeguard banana plantations from foliar diseases like Black Sigatoka, but also enhance the health of the soil microbiome. Additional examples of ecologically sound practices include the removal of infested plant material, proper management of plant debris, and the use of biocontrol agents as an alternative to conventional pesticides.


In conclusion, **Mr Dusunceli** underscored the critical role of pesticides in modern agriculture, provided they are employed responsibly and effectively. Their use should be guided by weather data and modelling. Furthermore, only registered chemicals should be used, ensuring the correct active ingredient is applied at the appropriate time, dose, and following established protocols. Concurrently, farm workers must adhere to safety standards including the use of personal protective equipment and the safe disposal of waste, containers, and packaging materials.

A webinar attendee asked if practices like employing organic and chemical fertilizers, implementing agro-forestry systems, starting crop rotation, and using cover crops could help reduce the use of pesticides and fertilizers. The attendee also sought additional strategies beyond IPM to reduce pesticide application. In response, **Mr Dusunceli** explained that all these sound practices fall within the purview of IPM. However, the efficiency of these techniques can vary significantly depending on the ecosystem. **Mr Laprade** added that the management of biofertilizers, including the dosage and application method, should be dependent on soil analysis results in order to avoid unnecessary input wastage. He also noted that the use of cover crops can enhance the rotation of chemicals. Finally, effective drainage systems strongly contribute to prevent disease spread, while the adoption of disease-resistant cultivars proves effective in coping with phytosanitary challenges. **Mr Gandini, Banelino**, commented that the use of biocontrol agents against pests and diseases in banana plantations are valid alternatives to chemical pesticides and that precision agriculture could be employed as well.

## 5. Closing Remarks

**Mr Prada** thanked all webinar participants and emphasized the importance of future events that would involve the expertise of individuals from the European Union and the European Commission. This collaboration would seek to identify the necessary measures to comply with the new regulations on MRLs. Mr Prada then offered a broad overview of the topics addressed by **Mr Guibiao Ye, Mr Sergio Laprade** and **Mr Fazil Dusunceli** during the webinar.

He also stressed that the WBF's webpage offers comprehensive information on all previous webinars covering a wide range of topics, from market access to prevention and control of *Fusarium oxysporum* f. sp. cubense Tropical Race 4. He then drew attention to the issue related to the chemical analysis of the banana peel or flesh and the potential implications of exceeding certain residue levels. Lastly, **Mr Prada** invited all attendees to actively engage in the discussions on MRLs and other important topics that will take place during Fruit Attraction 2023 in Madrid,



Spain, from the 2 to 5 October. The discussions will be hosted by the WBF. Mr Lima thanked all participants and panellists and closed the session.

## CONTACT

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