IAEA

Joint FAO/IAEA Division
of Nuclear Techniques in Food and Agriculture

Third FAO-IAEA International Conference on Area-wide Management of Insect Pests: Integrating the Sterile Insect and Related Nuclear and Other Techniques.

Fruit fly Programmes in Latin America –

Pedro Rendón/Walther Enkerlin

Vienna, Austria, May 22 – 26, 2017.

FOUR SECTIONS:

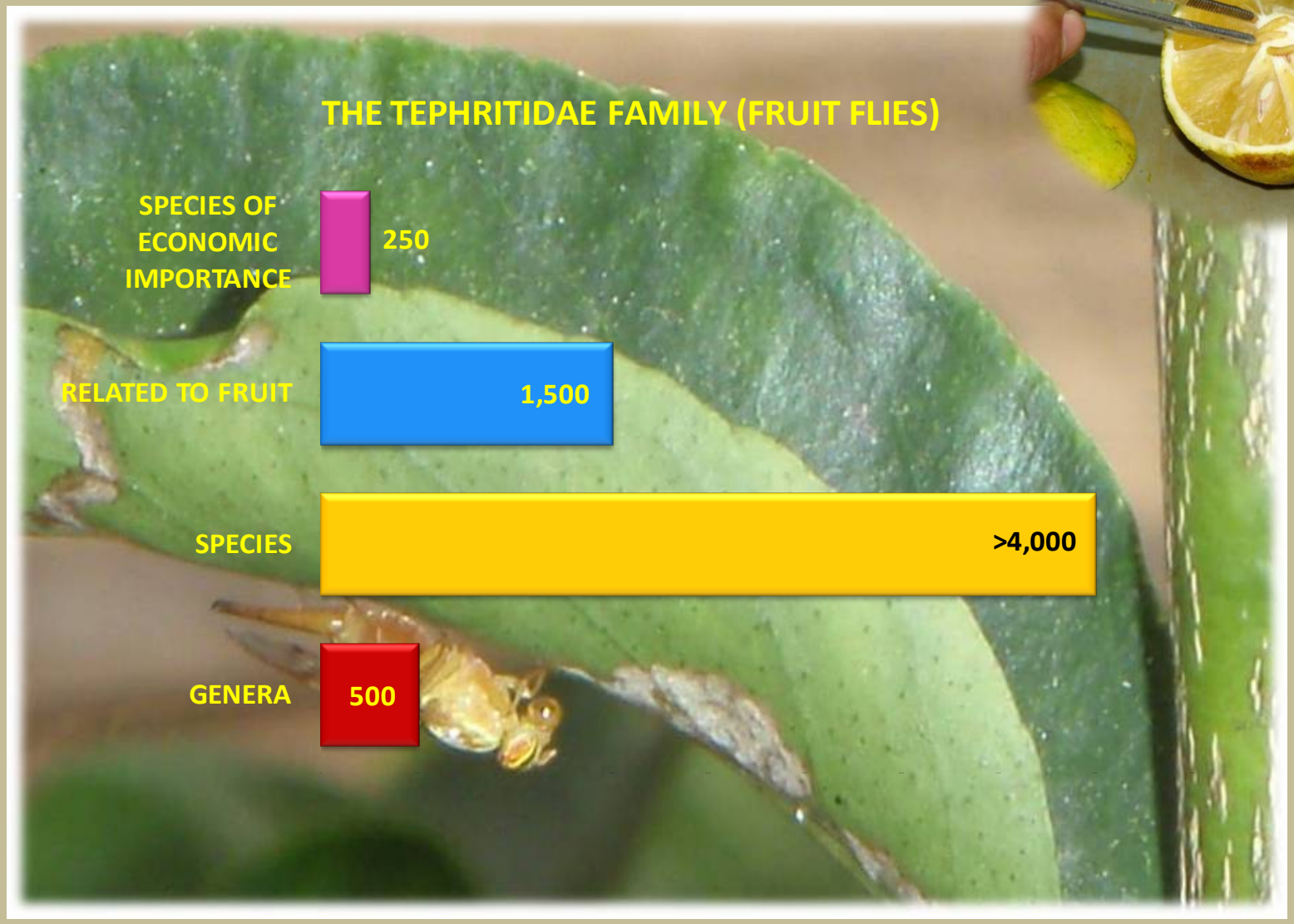
- **FRUIT FLY PESTS, WORLDWIDE DISTRIBUTION, MOVEMENT, INTRODUCTIONS AND THEIR ECONOMIC IMPACT,**

- **LAC – NEEDS AND OPPORTUNITIES TO CONTRIBUTE TO FOOD SECURITY & FOOD SAFETY**

- **BRIEFING ON THE STATUS OF FRUIT FLY PROGRAMS IN THE LAC REGION**

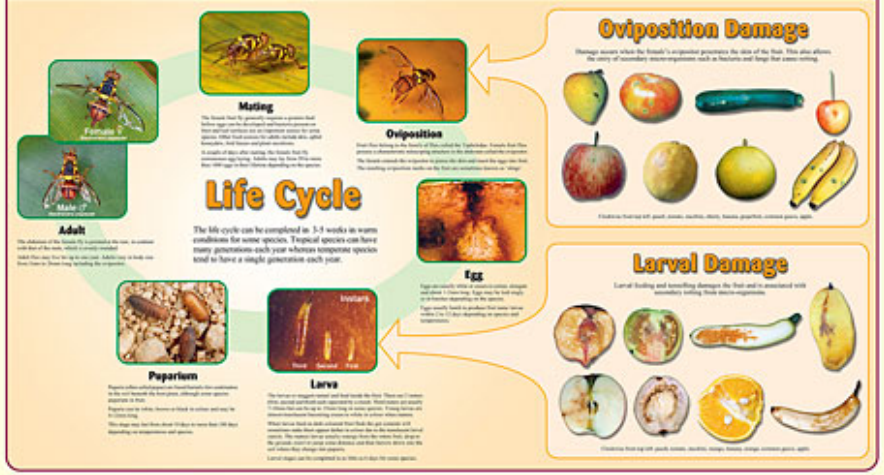
- **MEMBER STATES IN LATIN AMERICA BENEFIT FROM IAEA AND FAO TECHNICAL COOPERATION.**

FRUIT FLIES AND THEIR ECONOMIC IMPACT WORLDWIDE



FRUIT FLY PESTS OF THE WORLD (1)

Fruit flies are among the world's most important pests of fruits and vegetables.



The life cycle can be completed in 3-5 weeks in warm conditions for some species. Tropical species can have many generations each year whereas temperate species tend to have a single generation each year.

Sponsored by Joint FAO/IAEA Programme Nuclear Techniques in Food and Agriculture

Scientific Advisory Services Pty Ltd

FRUIT FLY PESTS OF THE WORLD (2)

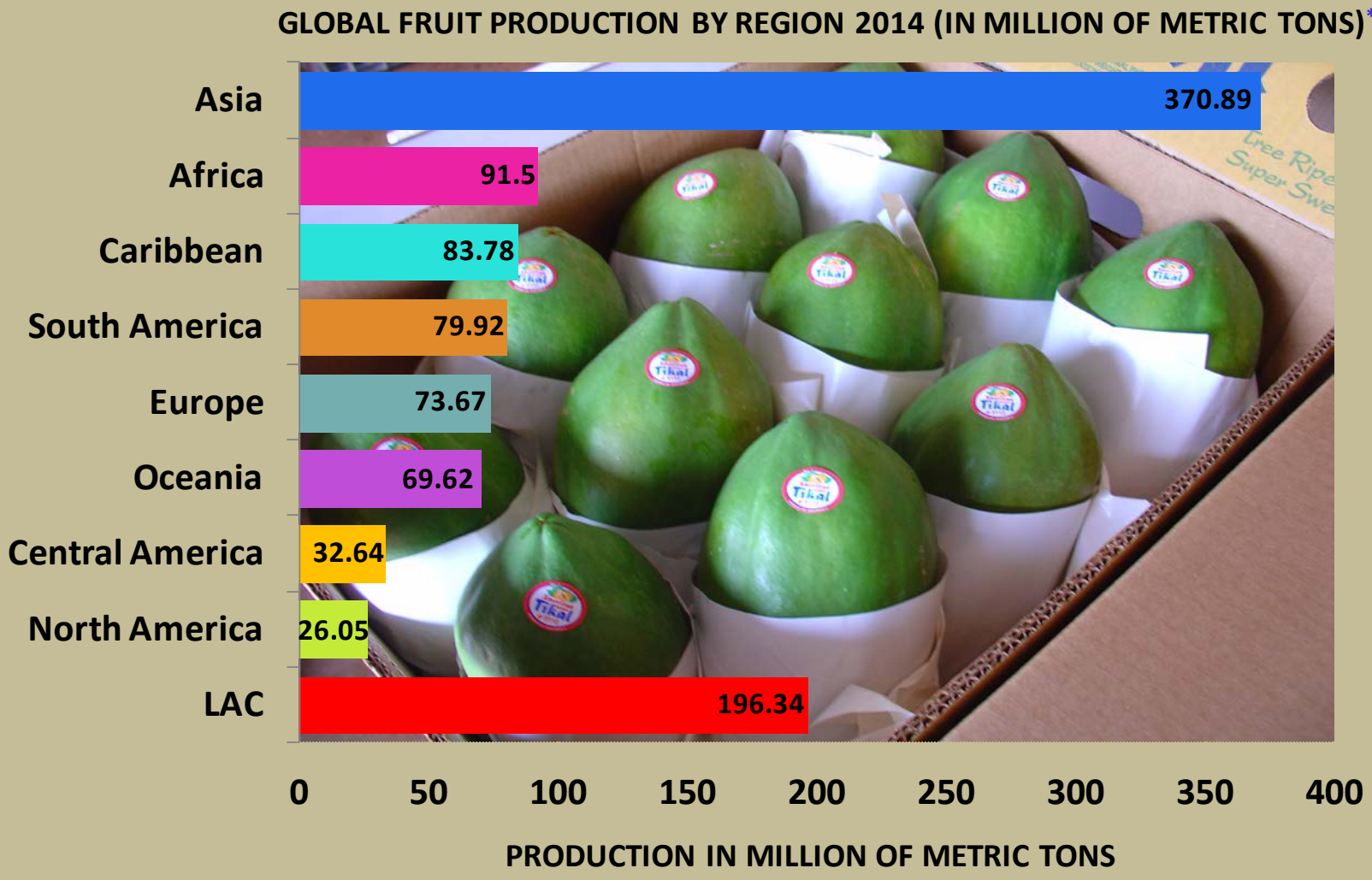
Fruit flies attack a wide range of crops and affect the trade of these commodities between regions.

Sponsored by Joint FAO/IAEA Programme Nuclear Techniques in Food and Agriculture

Scientific Advisory Services Pty Ltd

FACTORS THAT CONTRIBUTE TO PEST MOVEMENT & ESTABLISHMENT – 3T's

GLOBAL TRADE AND TRANSPORT: Fruit trade will increase in the coming years

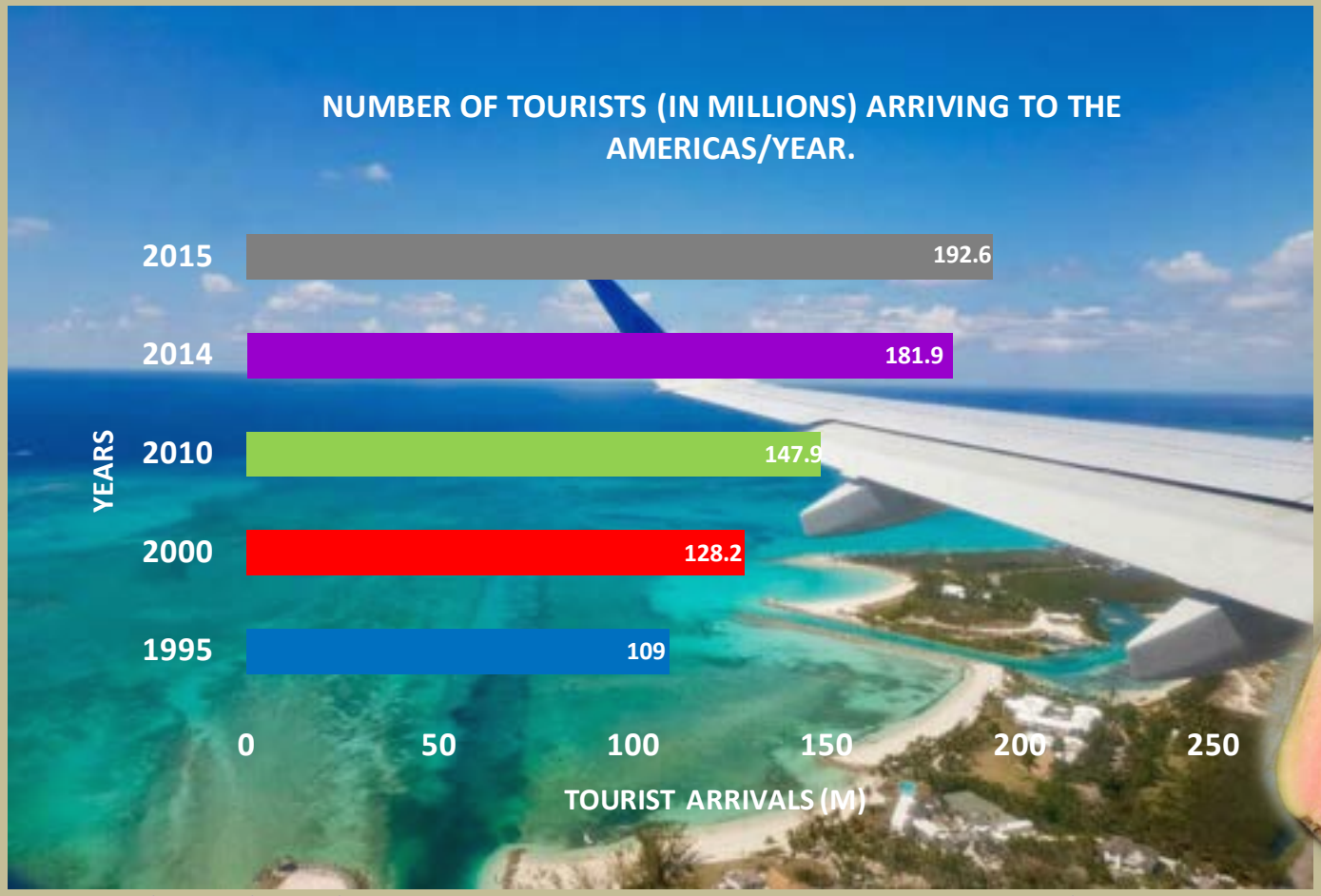


*https://www.statista.com/statistics/264004/fruit-production-worldwide-since-2007-by-region/ **with modifications.

FACTORS THAT CONTRIBUTE TO PEST MOVEMENT & ESTABLISHMENT

CLIMATE CHANGE: New areas will become susceptible to invasive species

HUMAN MOVEMENT/TRAVEL The dependence of the rate of introduction of invasive species on the growth of trade and **travel is widely recognized.**



https://www.statista.com/statistics/209349/forecast-number-of-international-tourist-arrivals-worldwide-by-region/

FRUIT FLY INTRODUCTIONS IN THE AMERICAS

Olive Fruit Fly
California, 1998

Caribbean Fruit Fly
Florida, 1965

Mediterranean fruit Fly
DR, 2015

Carambola Fruit Fly
Surinam, 1975

Mediterranean Fruit Fly
Brazil, 1901; CR, 1955, Peru, 1956
CHILE, 1963, GT, 1975

***Anastrepha* genus is native to Latin America and the Caribbean with seven economically important species and *Toxotrypana* , the papaya Fruit Fly.**

Ceratitis capitata

"medfly" is one of the most important threats worldwide to fresh fruits is capable of infesting from 250 to 400 hosts (2) .

Estimated to cause US$242 million/year in economic losses in Brazil alone (4).

Establishment in Guatemala, Mexico and the USA would cause direct damage of no less than US $20 billion/year (1,3)

CONCLUSIONS

- Frequent FF invasions could occur due to **increased risks from globalization** (trade/transportation and human movement).
- Latin – America is **at risk of introductions of non-native FF species**.
- There are **trade regulations that hamper exports** if fruit flies of quarantine importance are present in the countries.

RECOMMENDATIONS

- Strengthen surveillance networks to **early detect fruit fly entries** and prevent establishment.
- **Develop an emergency plan to eradicate** all possible FF introductions to avoid potential establishment and the enforcement of quarantine regulations.

LATIN AMERICA AND THE CARIBBEAN – NEEDS AND OPPORTUNITIES TO CONTRIBUTE TO FOOD SAFETY AND SECURITY

- Agricultural diversification
- Increased fruit and vegetable production and exports
- Job creation
- Concern for low pesticide residues to protect human health and the environment.

LATIN-AMERICA AND THE CARIBBEAN (LAC)

- **LAC** surface area ca. **19.2 million Km² .**
  > 640 million inhabitants.

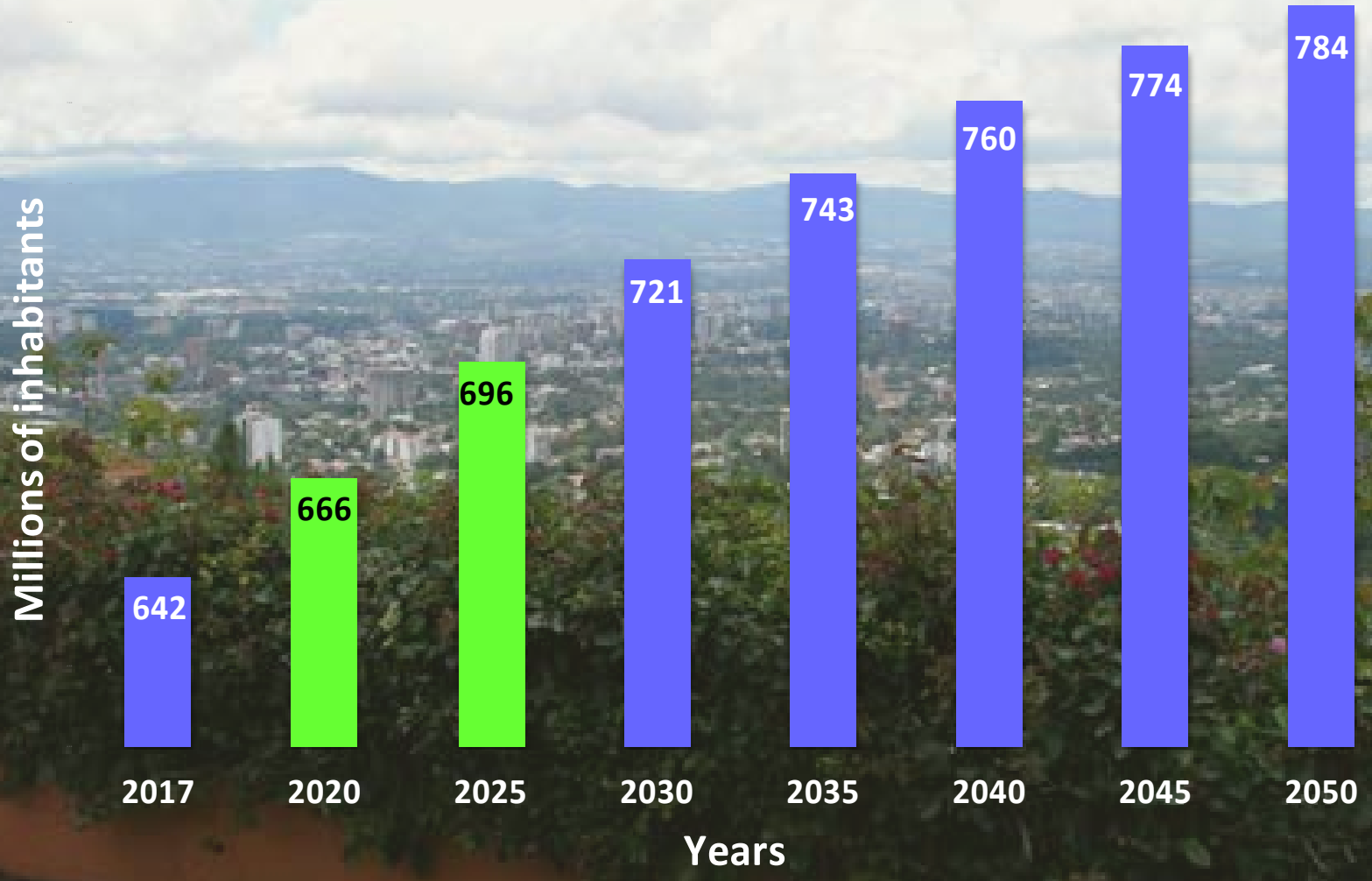
- **Good climatic conditions** for fruits and vegetables for local/export markets.

- **LAC** is **net exporter of agricultural** commodities to the world, **ca. 16% of global food and agriculture exports** between 2012 and 2014.

- Always maintained a strong **comparative advantage** in agricultural production. (8)

- **Production/investments** are threatened by the presence of **native or non-native** fruit fly (FF) species.

Projected Human Population Increase in Latin-America (2017 - 2050)*



*Graph produced with data available at: http://www.worldometers.info/world-population/

LAC – NEEDS TO INCREASE PRODUCTION OF FRUIT AND VEGETABLES

Due to the trend **in human population growth.**

The need **to contribute to end hunger, achieve food security** and improve nutrition, key steps to sustainable development (UN, 2016).

The 'triple burden' of malnutrition which consists of:

- under nutrition
- micronutrient deficiencies
- overweight and obesity

➢ there is a need for the **reduction of non-communicable diseases (FAO,2017, 1)**

Increasing access to healthy diets through social protection and income generation strategies

Subsidies for fresh fruits and vegetables **that reduce prices**

Could **increase fruit and vegetable consumption.**

LAC - OPPORTUNITIES FOR EXPORTS

The customers are changing preferences → **Food for health**

Production for intra and interregional markets

- All of the items above warrant increased production of

Fruit and vegetable products

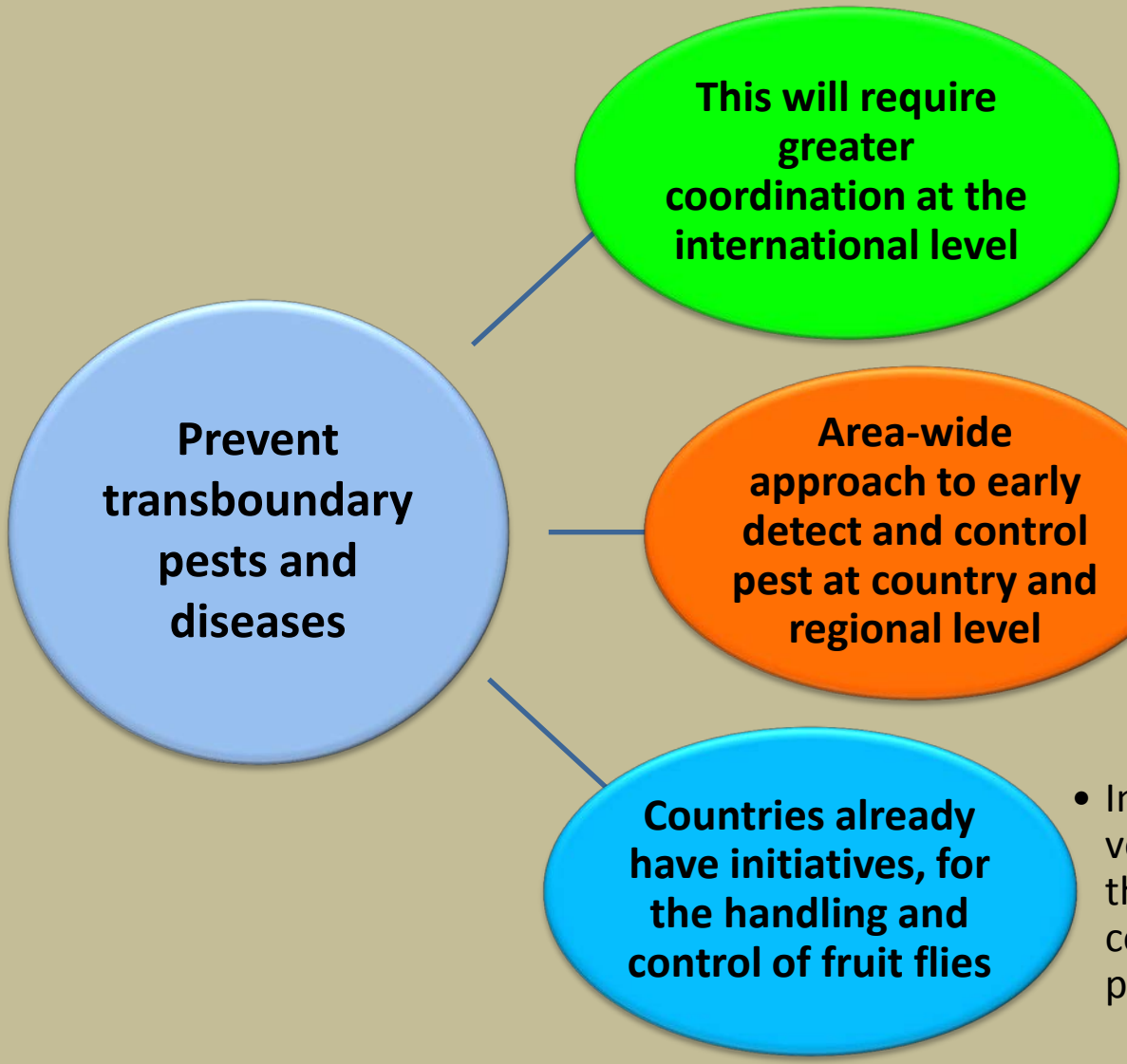
Food safety is also a key concern

- **Unsafe food remains a major cause of disease and death** (WHO, 2015)

- Increased need for safe non-residual pest control tactics which have

INCLUDE THE USE OF THE STERILE INSECT TECHNIQUE (SIT)

GLOBAL CHALLENGES FOR FOOD AND AGRICULTURE*



- to **understand the risks and then control,** prevent and eradicate pests and diseases.
- has shown to be a **more cost-effective and environmentally friendly** option **compared with the individual reactive farm by farm approach.**
- Integration and coordination can be very useful to address the problem of these pests at regional level and at the country level, depending on their particular needs.

*FAO. The future of food and agriculture. Trends and challenges. 2017. http://www.fao.org/3/a-i6583e.pdf

STATUS OF FRUIT FLY PROGRAMS IN THE LAC REGION

AREA-WIDE APPROACH FOR FUIT FLY CONTROL

TRAPPING – Large number of traps to monitor pest presence

MAPPING – GPS & GIS of the region

CONTROL ACTIVITIES/GAP – GPS & GIS of Control activities

STERILE INSECT RELEASES TO ACHIEVE CONTROL, ERADICATION Or as preventative releases.

AREA-WIDE FRUIT FLY TRAPPING

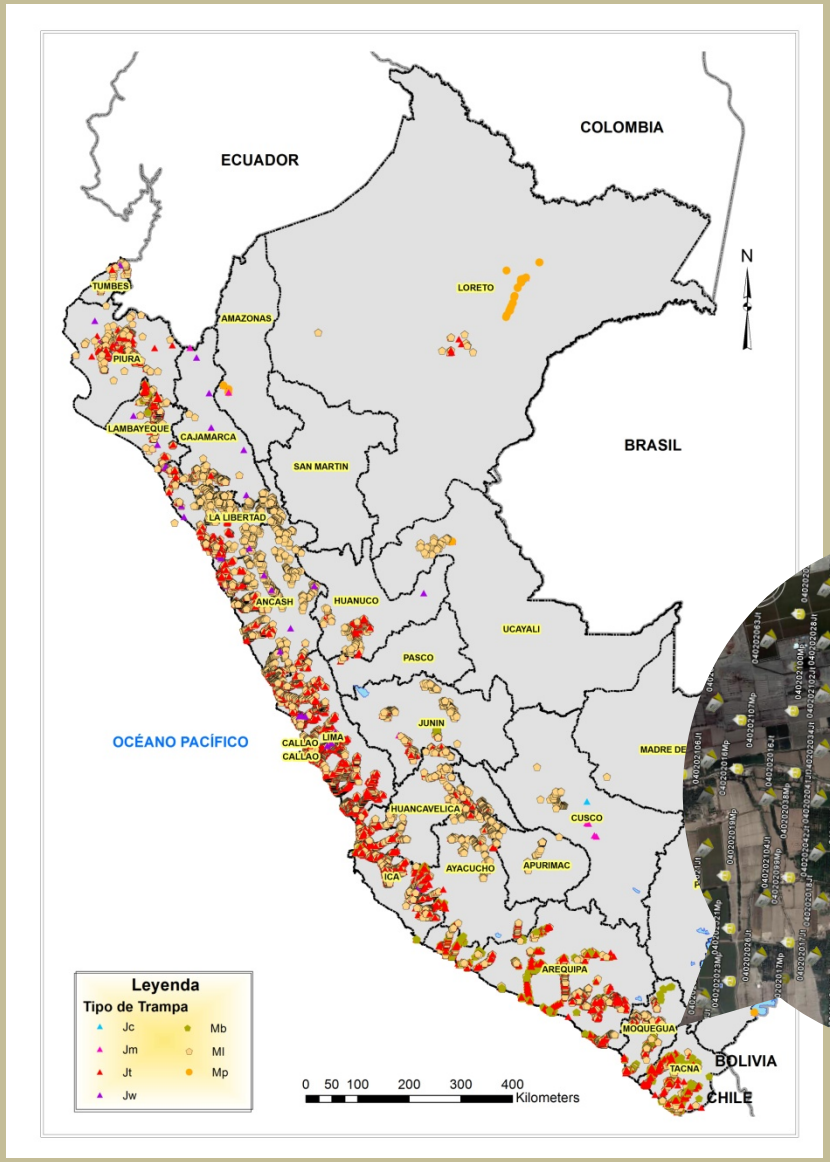
ARGENTINA: Distribución espacial de trampas

Densidad
- 1 trampas/km² en áreas rurales
- 2 a 6 trampas/km² en áreas urbanas

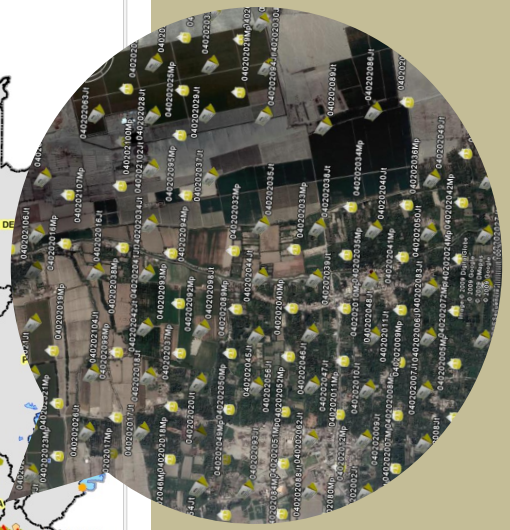
senasa

PERU:

Sistema Nacional de Vigilancia



TRAPS IN OPERATION 36, 000



AREA-WIDE FUIT FLY CONTROL – SPRAYS USING AN ORGANIC PRODUCT

PRODUCTION OF STERILE FRUIT FLIES IN LATIN AMERICA: REARING FACILITY AT LA MOLINA, LIMA, PERU.

SENASICA, NEW METAPA, MEXICO PRODUCTION FACILITY

MENDOZA, ARGENTINA FACILITY

EL PINO, GUATEMALA

ARICA, CHILE

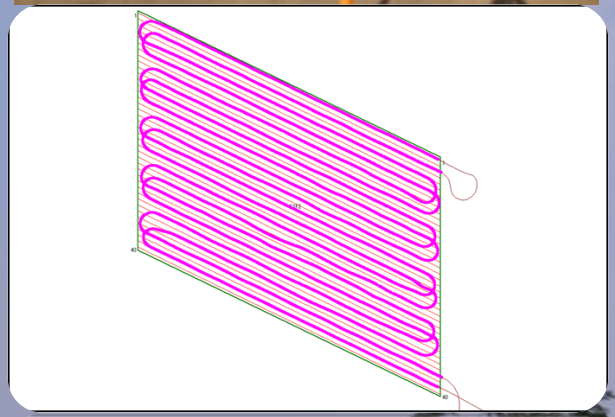
PRODUCTION OF STERILE FRUIT FLIES IN LATIN AMERICA.

MEDITERRANEAN FRUIT FLY *Ceratitis capitata* (Wied)	
REARING FACILITY	**PRODUCTION (million SI/Week)**
ARICA, CHILE	22
EL PINO, GUATEMALA*	1,200
LA MOLINA, PERU	40-60
MENDOZA, ARGENTINA	300
METAPA, MEXICO In brackets potential production with the new plant.	500 (1,000)
MEXICAN FRUIT FLY - *Anastrepha ludens* AND OTHER SPECIES	
REARING FACILITY	**PRODUCTION**
MOSCAFRUT, MEXICO, *Anastrepha ludens*	60 M (standard strain); 86 M TBP7 (GSS)
MOSCAFRUT, MEXICO, *A. obliqua*	62

*El Pino Mass Rearing Facility, has produced and shipped sterile males of the Temperature Sensitive Lethal (TSL strain) to EEUU, Argentina, Israel, Honduras, Dominican Republic and could provide this service to other FF programs.

EMERGENCE AND RELEASE CENTER FOR ANASTREPHA SPECIES AT GUERRER0, MEXICO INVESTMENT MADE BY MANGO PRODUCERS OF THE REGION.


TG-AGY



COST – BENEFIT OF AREA WIDE CONTROL ACTIONS IN FRUIT FLY PROGRAMS

COUNTRY	COST:BENEFIT RATIO (U.S.$) FOR EVERY DOLLAR SPENT:RETURN
CHILE	1:1,000
TRI-NATIONAL MOSCAMED PROGRAM	1:128
PRP PROGRAM, LA, CALIFORNIA	1:87
CAMPAŇA NACIONAL MF	1:24

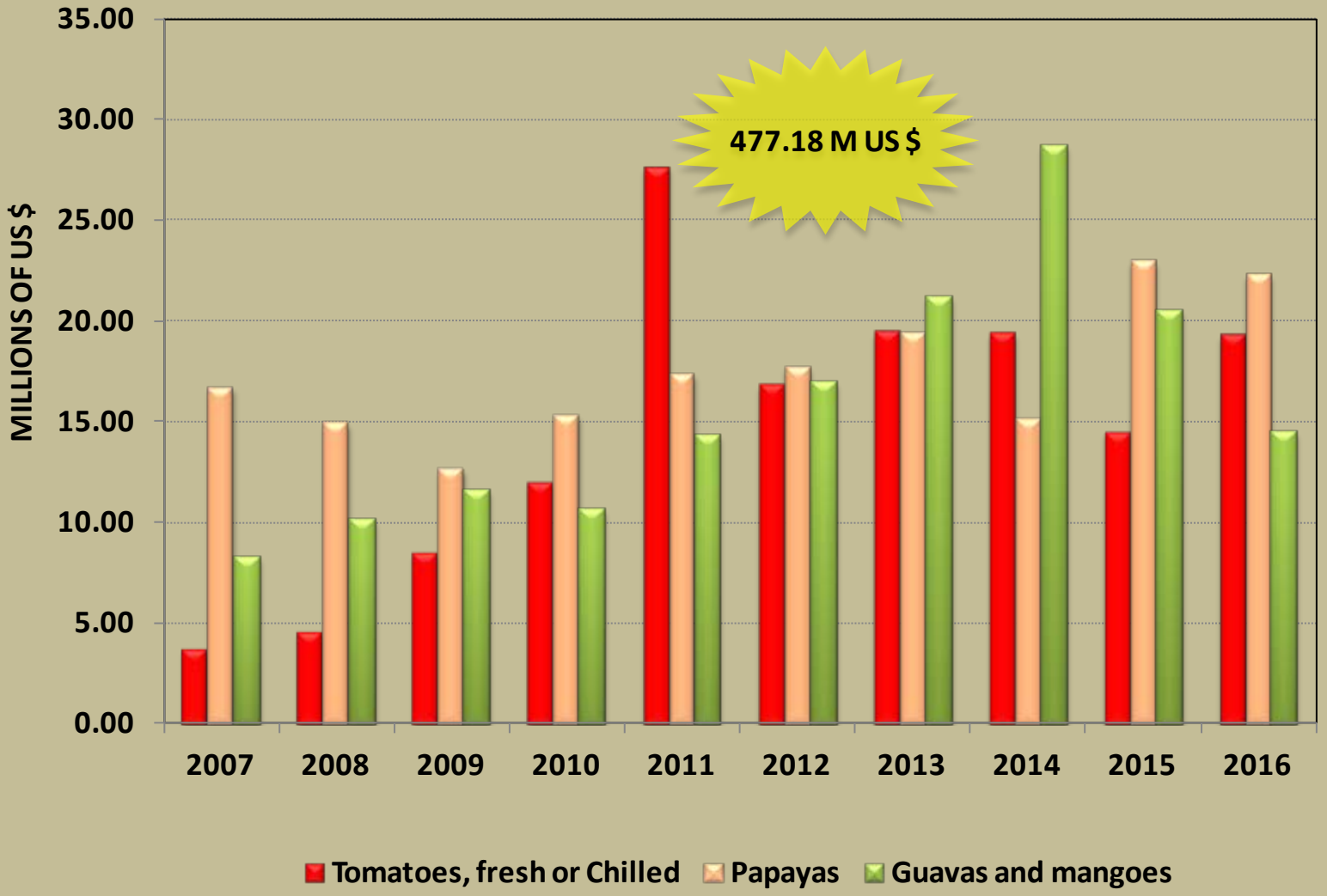
MEMBER STATES IN LATIN AMERICA AND THE CARIBBEAN BENEFIT FROM IAEA AND FAO TECHNICAL COOPERATION.

REGIONAL COOPERATION

OBJECTIVES

1. **Increase** fresh fruit and vegetable **exports.**
2. **Extend pilot** areas **into commercial** areas of Pest Free and Low Pest Prevalence.
3. **Capacity building** in taxonomy, control & management of *A. grandis* in Panama and the wider C.A and Caribbean region
4. **Improve cooperation** among regional and international partners (USDA, OIRSA, IICA)
5. **Trained technicians** and professionals that are capable of managing IPM programs.

TOTAL AMOUNT OF EXPORTS (IN MILLIONS OF US $) OF SELECTED PRODUCTS FROM CENTRAL AMERICA AND THE DOMINICAN REPUBLIC TO THE US MARKET. YEARS 2007 - 2016.



DATA SOURCE: https://usatrade.census.gov/

REGIONAL COOPERATION

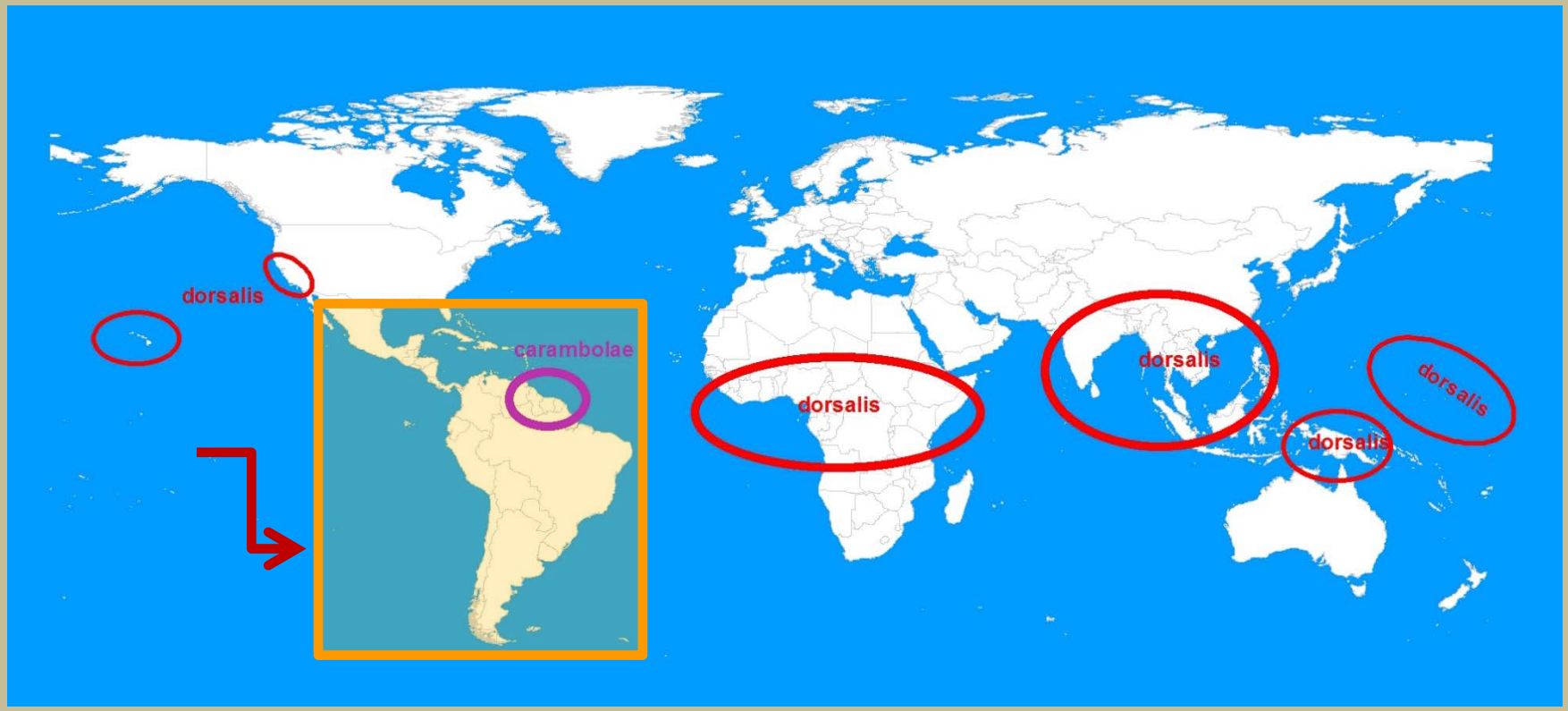
FRUIT FLIES DO NOT STOP AT THE BORDER.

OBJECTIVES

1. **Strengthen, expand and harmonize surveillance systems for fruit flies** of economic/quarantine **interest including those not present in the continent.**

2. **Use new technologies to improve** detection and program control activities, including the **use of SIT as a component of the integrated management of fruit flies.**

3. **Establishment and declaration of free and low prevalence areas** with the purpose of stimulating the **development of the fruit and vegetable industry for export purposes.**



Africa: *Bactrocera dorsalis and Ceratitis cosyra* **are a major obstacle to mango production.**

Major Latin American mango producers*: Brazil, Costa Rica, Ecuador, Guatemala, México, Nicaragua, Panamá, Perú.

* In alphabetic order

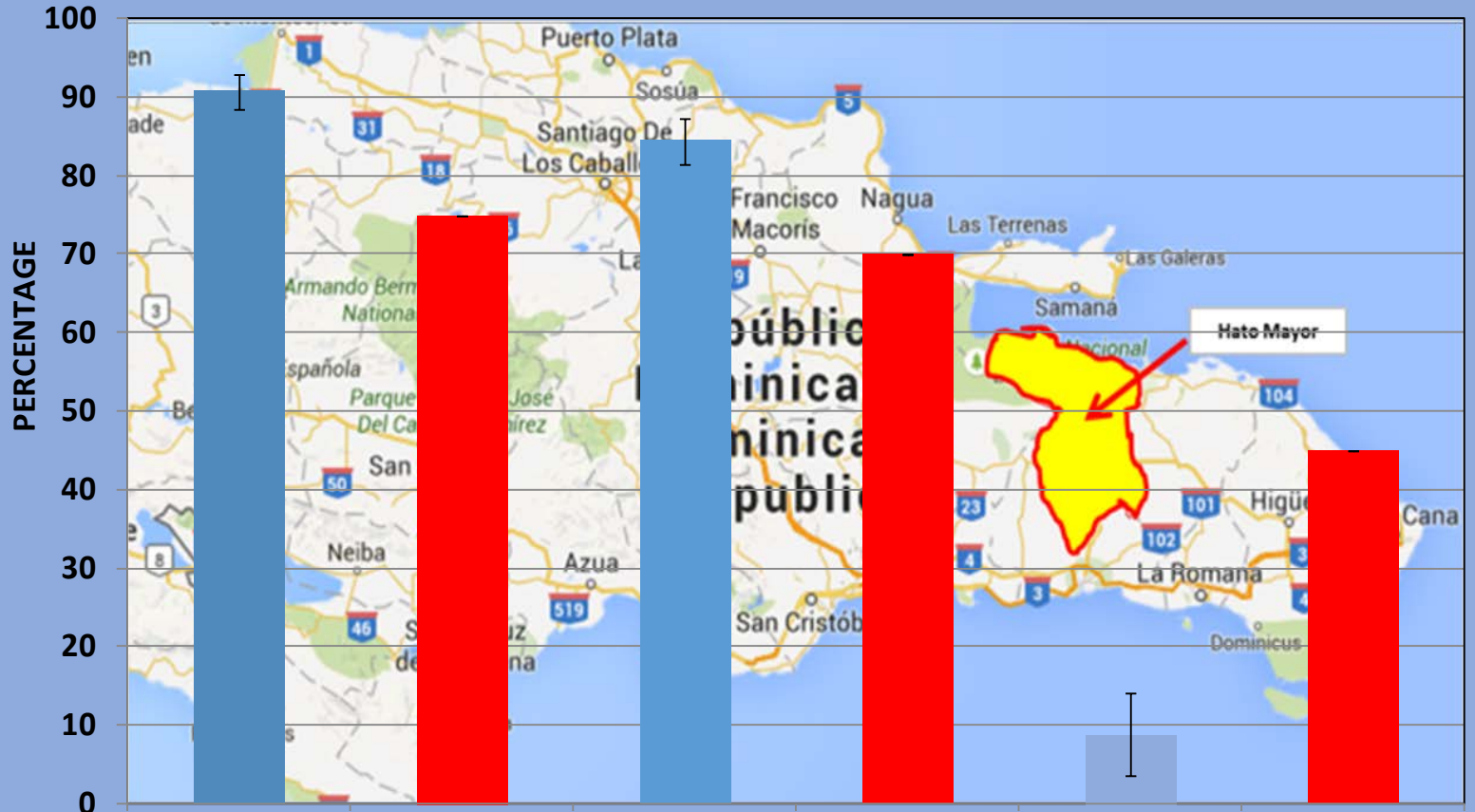
http://www.pbcrc.com.au/news/2014/pbcrc/media-release-what%E2%80%99s-name-everything-if-you%E2%80%99re-fruit-fly

REGIONAL COOPERATION - COORDINATION MEETINGS - TRAINING


TALLER REGIONAL RLA5070/9005/01 - SAG-IAEA
SAN ESTEBAN - V REGION - 29 MARZO 2017

REGIONAL COOPERATION - PROVISION OF STERILE FLIES FOR ERADICATION PROGRAM

QUALITY CONTROL PARAMETERS AND THEIR RESPECTIVE VALUES OF PUPAE SHIPMENTS OF STERILE MALES OF THE MEDITERRANEAN FRUIT FLY FROM EL PINO MASS REARING FACILITY , GUATEMALA TO THE EMERGENCY ERADICATION PROGRAM OPERATING IN THE DOMINICAN REPUBLIC. SHIPMENTS DURING 2016.



EXPORTS

FOOD SECURITY

The contributions and leading role of the IAEA and FAO through area-wide SIT technology are relevant to the food security and sustainable development goals of the countries in the region.

THANK YOU!

REFERENCES:

1.) FAO. The future of food and agriculture. Trends and challenges. 2017. http://www.fao.org/3/a-i6583e.pdf

2.) Liang GQ (2011) Fruit flies (Diptera: Tephritidae: Dacinae: Trypetinae: Tephritinae). Beijing: China Agricultural Press; doi

3.) Li ZH, J F, Ma XL, F Y, S ZZ, et al. (2013) Review on prevention and control techniques of Tephritidae invasion. Plant Quarantine 27:1–10.

4.) Oliveira, C. M., Auad, A. M., Mendes, S. M. and Frizzas, M. R. (2013), Economic impact of exotic insect pests in Brazilian agriculture. J. Appl. Entomol., 137: 1–15. doi:10.1111/jen.12018

5.) Pimentel et al, 2001. Economic and environmental threats of alien plant, animal, and microbe invasions Agriculture, Ecosystems and Environment 84: 1-20

6.) Qin Y, Paini DR, Wang C, Fang Y, Li Z (2015) Global Establishment Risk of Economically Important Fruit Fly Species (Tephritidae). PLoS ONE 10(1): e0116424. doi:10.1371/journal.pone.0116424

7.) Stuhl, Charles, Sivinski, John, Teal, Peter, Paranhos, Beatriz, Aluja, Martin: A Compound Produced by Fruigivorous Tephritidae (Diptera) Larvae Promotes Oviposition Behavior by the Biological Control Agent *Diachasmimorpha longicaudata* (Hymenoptera: Braconidae). *Environ Entomol* 2011; 40 (3): 727-736. doi: 10.1603/EN10198

8.) White IM, Elson-Harris MM (1992) Fruit Flies of Economic Significance: Their Identification and Bionomics. CABI Publishing CAB Interregional.

9.) World Bank. 2013. *Agricultural exports from Latin America and the Caribbean : harnessing trade to feed the world and promote development*. Washington, DC ; World Bank Group. http://documents.worldbank.org/curated/en/469821468088456579/Agricultural-exports-from-Latin-America-and-the-Caribbean-harnessing-trade-to-feed-the-world-and-promote-development

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4294639/#pone.0116424.ref021

4.A.) http://onlinelibrary.wiley.com/doi/10.1111/jen.12018/abstract

6.A.) https://www.google.com.gt/?gfe_rd=cr&ei=7cWIn0FKew8wfpuqWACg&gws_rd=ssl#q=fruit+flies+and+their+economic+impact+worldwide&*&spf=63

1.) Enkerlin W (2005) Impact of fruit fly control programmes using the sterile insect technique. Sterile Insect Technique, Principles and Practice in Area-Wide Integrated Pest Management (ed. by VA Dyck, J Hendrichs & AS Robinson), pp. 651-673. *Springer, Dordrecht, The Netherlands.*

3.) IICA (2013) Evaluación Económica del Programa Moscamed en Guatemala y sus impactos en ese país, México, Estados Unidos y Belice (by D Salcedo-Baca, JR Lomelí-Flores & GH Terrazas-González). Kavers S.A. de C.V. Mexico City, Mexico. 188 pp.