Pesticide Residues Results from Monitoring Fruits in Brazil

Ciscato, CHP; Gebara, AB; Monteiro, SH; Souza, GS; Barbosa, CM

Pesticide Residues Laboratory
Biological Institute – Sao Paulo/Brazil

Pesticide market in Brazil

- In Brazil almost 370 active ingredients are used to produce insecticides, fungicides, herbicides and others
- The consumption is about 2.9 kg a.i./hectare (according to governmental statistics)

INSTITUTO BIOLÓGICO

IB LRP Laboratório Resíduos Pesticidas

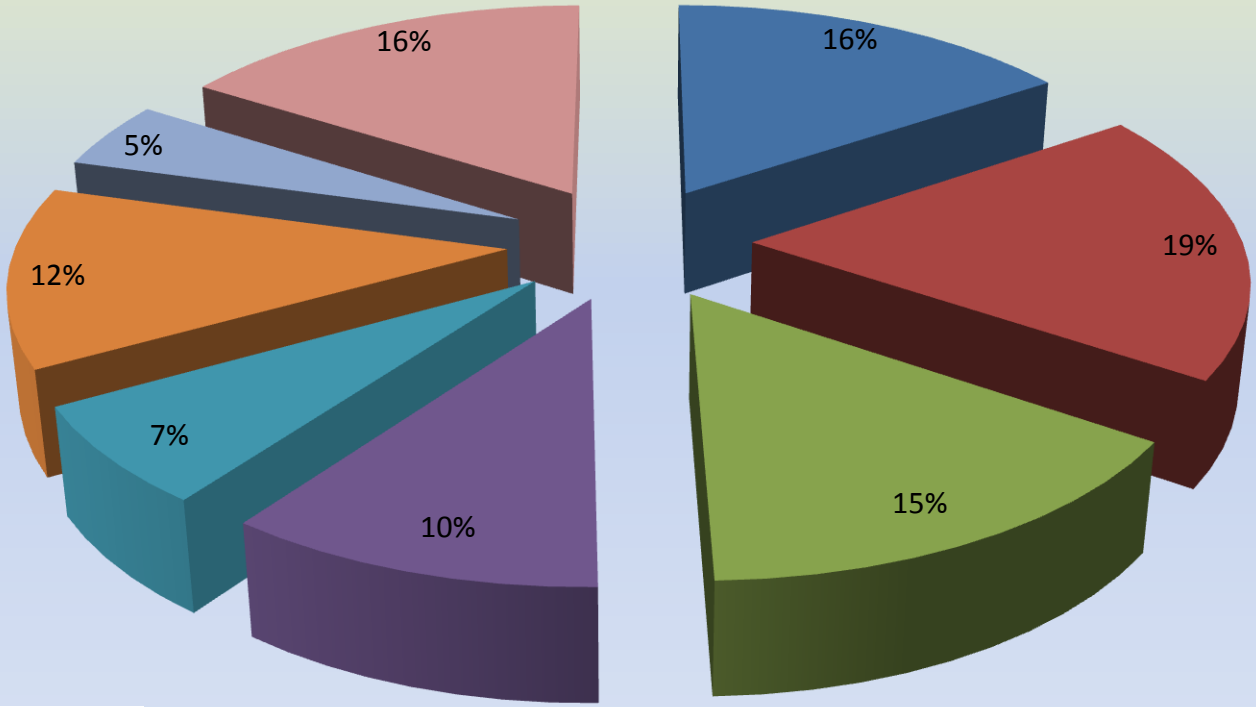
Fruit market in Brazil

- According IBRAF (Brazilian Fruit Institute), Brazil is the 3rd in the rank of fruit production (1st China and 2nd India)
- Brazil is the 15th in the rank of exported fruits
- About 2% of fruit *in natura* are exported mainly to European Community
- The majority of fruit production is involved with pesticide usage

Pesticide monitoring studies in Brazil

- In 1978, it was established the “Pesticide Residues Monitoring Program in Fruits and Vegetables” by the team of the Pesticide Residues Laboratory (**LRP**)/Biological Institute/APTA – São Paulo State and CEAGESP (the biggest Commercialization Food Center in Latin America and the 3rd in the world)
- At the beginning, from 1978 to 1980 it was focused the pesticide usage in many different crops
- Organochlorine and organophosphorus pesticides were analyzed in fruit and vegetable samples

Fruits analyzed by LRP 2001 to 2006



INSTITUTO BIOLÓGICO

LRP Laboratório Resíduos Pesticidas

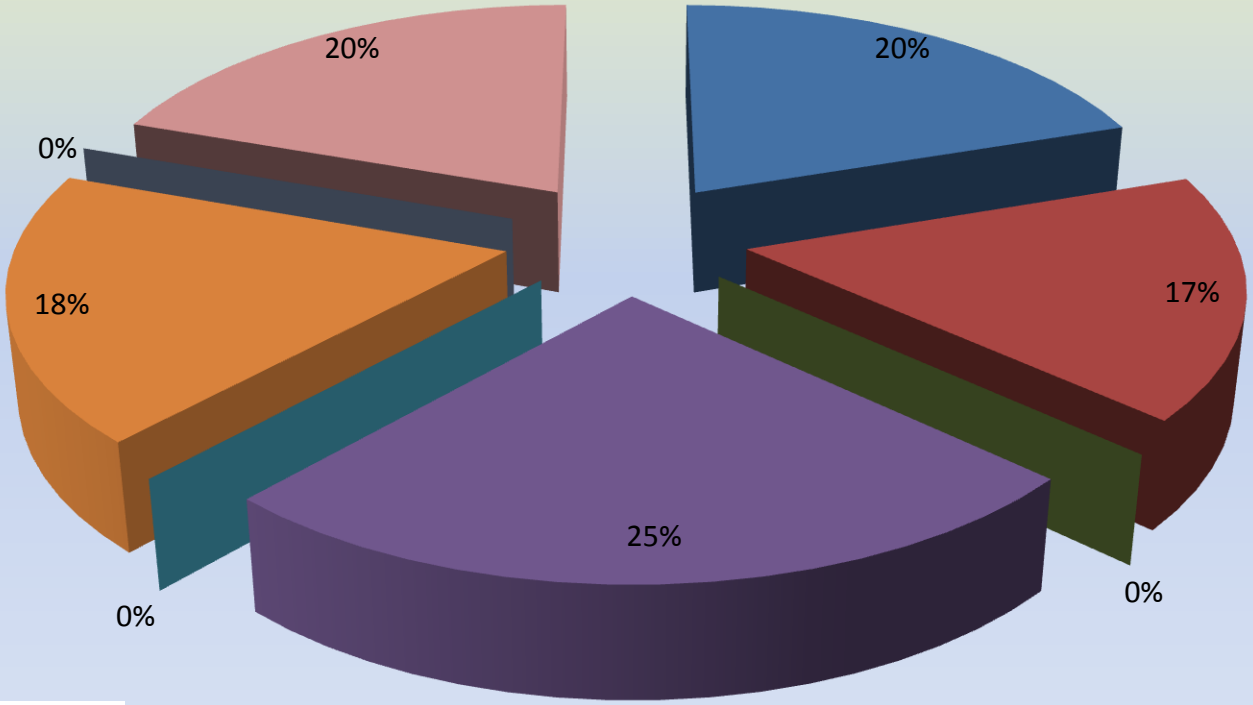
Pesticide monitoring studies in Brazil

- In 2001 the Pesticide Residues Monitoring Program (**PARA**) established by the Federal Health Agency (ANVISA) has started
- It was collected *in natura* fruit and vegetables
- The pesticide analysis was based in the Brazilian legislation

INSTITUTO BIOLÓGICO

IB LRP Laboratório Resíduos Pesticidas

Fruits analyzed by PARA 2001 to 2006



INSTITUTO BIOLÓGICO

LRP Laboratório Resíduos Pesticidas

Pesticide monitoring studies in Brazil

- It was employed a multi residue method
- Almost 100 pesticides were evaluated during the period from 2001 to 2006
- Ceagesp collected the samples for the program with LRP
- Sanitary Vigilance from different States collected the samples for the program to ANVISA

INSTITUTO BIOLÓGICO

IB LRP Laboratório Resíduos Pesticidas

Pesticide monitoring studies in Brazil

- Almost 85 to 95% of the analyzed samples were negative (pesticide residues at or below the MRL and no detectable substances)
- Strawberry was the commodity with more findings, results from LRP and PARA are quite same 58.02% LRP and 56.39% PARA considering negative for pesticide residues;

Pesticide monitoring studies in Brazil - Results

- Pesticides residues above the MRL contributed 0.7% to 13% to ADI
- The exception must be detached to imazalil in orange samples which the worst case contributed to 53.5% to ADI parameter
- Most of the pesticides found by LRP and PARA in the samples are: organophosphorus insecticides and fungicides

INSTITUTO BIOLÓGICO

IB LRP Laboratório Resíduos Pesticidas

Pesticide monitoring studies in Brazil - Results

- Pesticides authorized in fruit production and found in the study were: carbendazin, captan, carbaryl, chlorothalonil, chlorpyrifos, dicofol, dimethoate, ethion, endosulfan, fenitrothion, fenpropathrin, folpet, iprodione, methidathion, procloraz, parathion methyl, procymidone and tetradifon

Pesticide monitoring studies in Brazil - Results

- Pesticides found in all commodities during the period were: carbendazin, chlorothalonil; chlorpyrifos, captan, dimethoate and procymidone
- Some organochlorine pesticides were found in fruit samples as: aldrin, HCB, alpha HCH, heptachlor epoxy and mirex

Pesticide monitoring studies in Brazil - Results

Table 1 Pesticide residues above (levels in mg.kg^{-1}) MRL and commodities

commodity / pesticide	apple		banana		grape		orange		mango		papaya		Pineapple		strawberry	
	LRP	PARA	LRP	PARA	LRP	PARA	LRP	PARA	LRP	PARA	LRP	PARA	LRP	PARA	LRP	PARA
2001/2002																
azoxistrobin																0.5
fenpropathrin																2.13
iprodione																5.32
triazofos								0.03								
2003																
iprodione																3.0
propiconazole				0.4												
2004																
azoxistrobin																0.5
chlorpyrifos		1.07														
fenitrothion		0.61														
fluazinan															2.63	
2005																
carbaryl	2.52															
imazalil								5.7								
iprodione																
				0.1												
						1.5										

INSTITUTO BIOLÓGICO

IB LRP Laboratório Resíduos Pesticidas

Pesticide monitoring studies in Brazil - Results

Table 2 Pesticide residues found by LRP and PARA

commodity / pesticide	apple		banana		grape		orange		mango		papaya		Pineapple		strawberry	
	LRP	PARA	LRP	PARA	LRP	PARA	LRP	PARA	LRP	PARA	LRP	PARA	LRP	PARA	LRP	PARA
acephate															X	X
captan	X	X													X	X
chlorothalonil											X	X			X	X
chlorpyrifos	X	X														
Cyhalothrin lambda			X	X			X	X								
dicofol							X	X								
dimethoate	X	X					X	X							X	X
endosulfan															X	X
ethion							X	X								
fenitrothion	X	X														
fenpropathrin															X	X
folpet	X	X													X	X
iprodione																
methamidophos																
							X	X								
		X														

INSTITUTO BIOLÓGICO

IB LRP Laboratório Resíduos Pesticidas

Pesticide monitoring studies in Brazil - Results

Table 3 Pesticide residues above MRL and the contribution to ingestion

commodity / pesticide	apple LRP	apple PARA	banana LRP	banana PARA	grape LRP	grape PARA	orange LRP	orange PARA	mango LRP	mango PARA	papaya LRP	papaya PARA	Pineapple LRP	Pineapple PARA	strawberry LRP	strawberry PARA
2001/2002																
azoxistrobin																1.3%
fenpropathrin																3.7%
iprodione																4.6%
triazofos								8.3%								
2003																
iprodione																2.6%
propiconazole				2.3%												
2004																
azoxistrobin																0.8%
chlorpyrifos		1.6%														
fenitrothion		1.8%														
fluazinan															12.2%	
2005																
carbaryl	12.2%															
imazalil								53.5%								
iprodione															2.2%	
tebuconazole				0.8%												
		3%			0.8%											

ated according to Brazilian diet proposed by IBGE, 2003

INSTITUTO BIOLÓGICO

IB LRP Laboratório Resíduos Pesticidas

Pesticide monitoring studies in Brazil

- Brazilian legislation has changed for some pesticides found in the study after 2002, according to this, some products changed the category with MRL to Not Permitted for the Crop (chlorothalonil, captan, dicofol, folpet, methamidophos and parathion methyl)

INSTITUTO BIOLÓGICO

IB LRP Laboratório Resíduos Pesticidas

Pesticide monitoring studies in Brazil

- The data provided by PARA, LRP and others laboratories in Brazil are useful to evaluate the quality of the production of food and to advise the governmental and the consumers about the residue levels
- A continuous work must be taken to provide food with quality and safe for the consumers

INSTITUTO BIOLÓGICO

IB LRP Laboratório Resíduos Pesticidas

Pesticide monitoring studies in Brazil - Conclusion

- The low incidence of samples with pesticide residues above the MRL could indicate that substances with MRL established by Brazilian legislation have been used in the field in accordance with the good agricultural practices.

Muchas Gracias

Thank You for your attention

Muito obrigada

lrp@biologico.sp.gov.br

INSTITUTO BIOLÓGICO

IB
L R P
Laboratório Resíduos Pesticidas