



Pesticide Residue Monitoring Program in State of Qatar and Challenges From Global Legislation

Gouda Abdalla Ramadan, Ph.D.

Consultant, Food Safety Laboratories
Food safety Department
Doha-State of Qatar
ggoadah@moph.gov.qa



Food Safety Laboratories (FSL)

Food Safety Laboratory is an ISO/IEC 17025:2017 accredited government laboratory with State-of -the-art infrastructure, multiple branch laboratories and cutting-edge analytical instrumentation covering broad range of food safety aspects.

It is the solitary section of food safety department under Ministry of Public Health, responsible for food quality monitoring and control within the State of Qatar.

Food Safety Laboratories (FSL) & Branches

وزارة الصحة العامة
Ministry of Public Health
دولة قطر • State of Qatar



Hamad Port laboratory
Hamad Seaport



Ruwais Port Laboratory
Ruwais Landport



Abu Samra Port laboratory
Abu Samra Land port

Analyzing Pesticide Residue in Food Samples

- 500 Compounds

LC-MS/MS



- 250 Compounds

GCMS/MS



- 500 Compounds

LC-QTOF





Pesticide Residue Monitoring

Routine Monitoring

Routine monitoring program during the food safety inspection and control program (Import, Market Samples etc.).

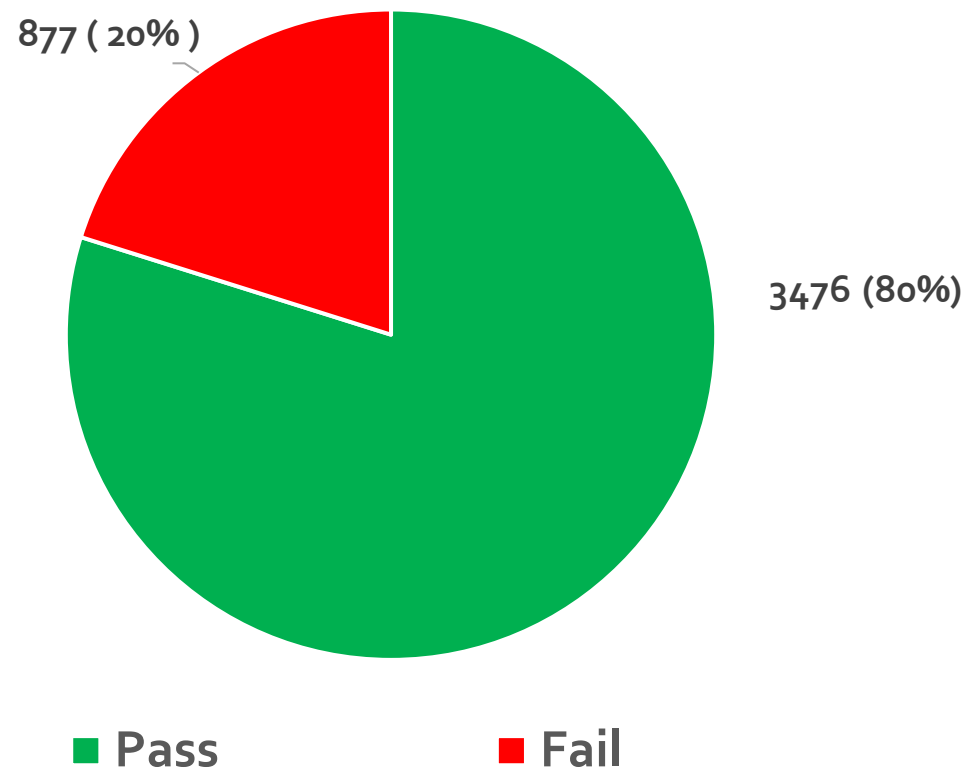
Planned Monitoring

Planned monitoring program with of Agricultural Affairs Department of Ministry of Municipalities, which is a seasonal program to monitor pesticide residues in locally produced vegetables.

Pesticide Residues- Routine Monitoring Program

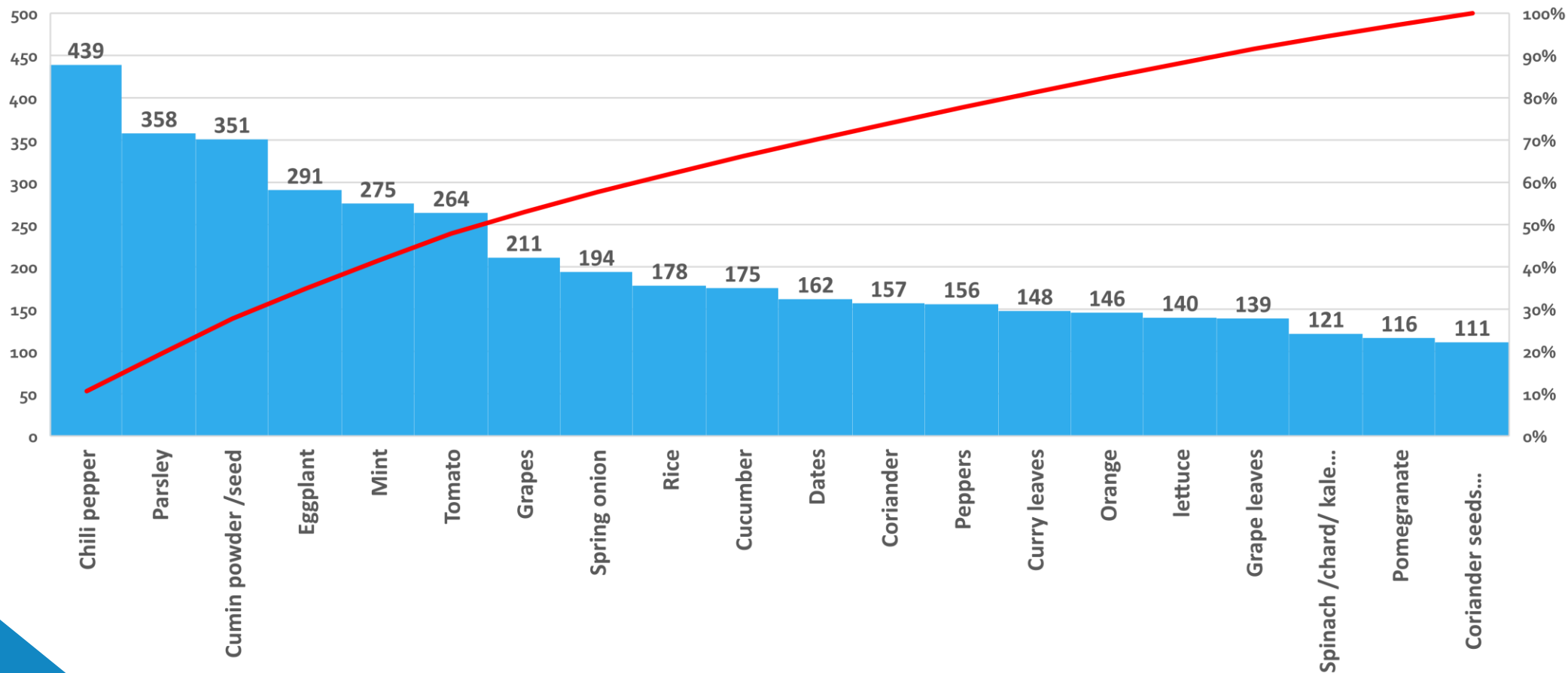
Routine Pesticides Residue Monitoring in Food - 2023

Food Safety Laboratories – Pesticides Residue Monitoring Data	
Year	2023
Total Samples Analyzed	4373
Complying with MRL %	80
Non-Compliance with MRL %	20



Food Commodities Frequently Contaminated with Pesticide Residue (2023)

Food Commodity Vs Number of Contaminated Samples



Food Commodities Frequently Contaminated with Pesticides Residue (2023)

Food commodities most frequently non-complying to MRL



CUMIN



GREEN PEPPER

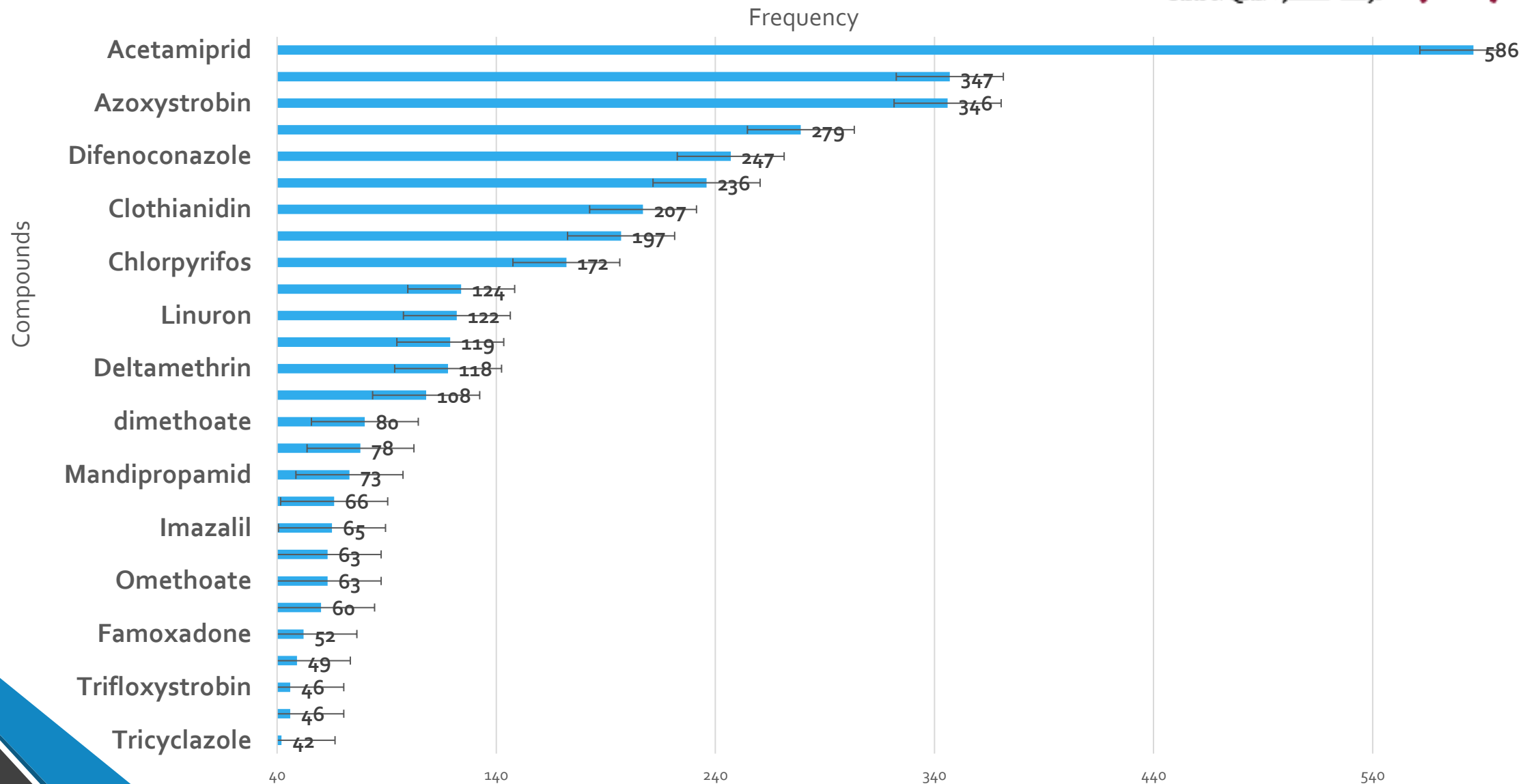


GRAPE LEAVES



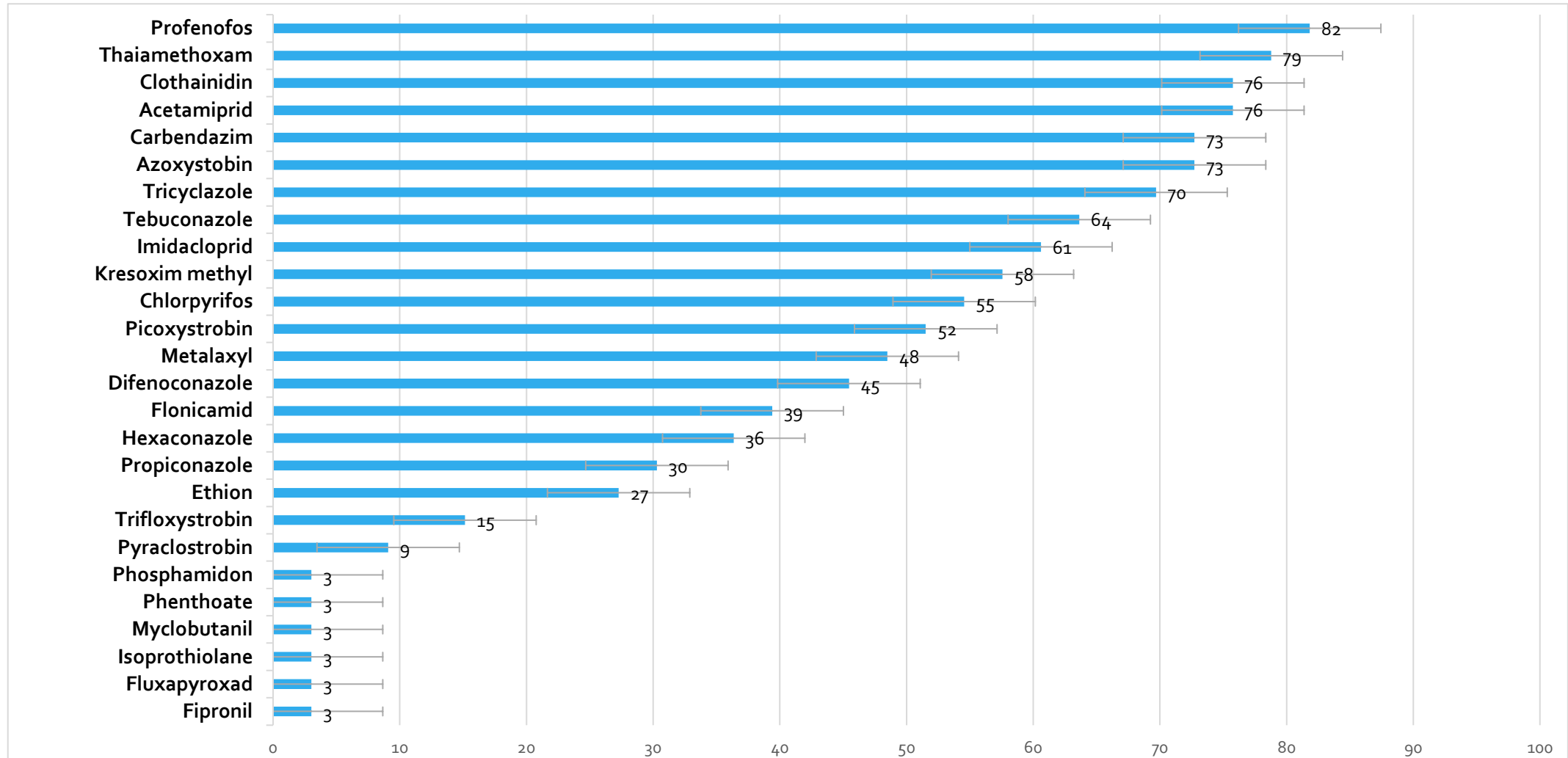
CARDAMOM

Frequently Detected Pesticide Residue in 2023



Frequently Detected Pesticide Residue (%) in Cumin Seeds

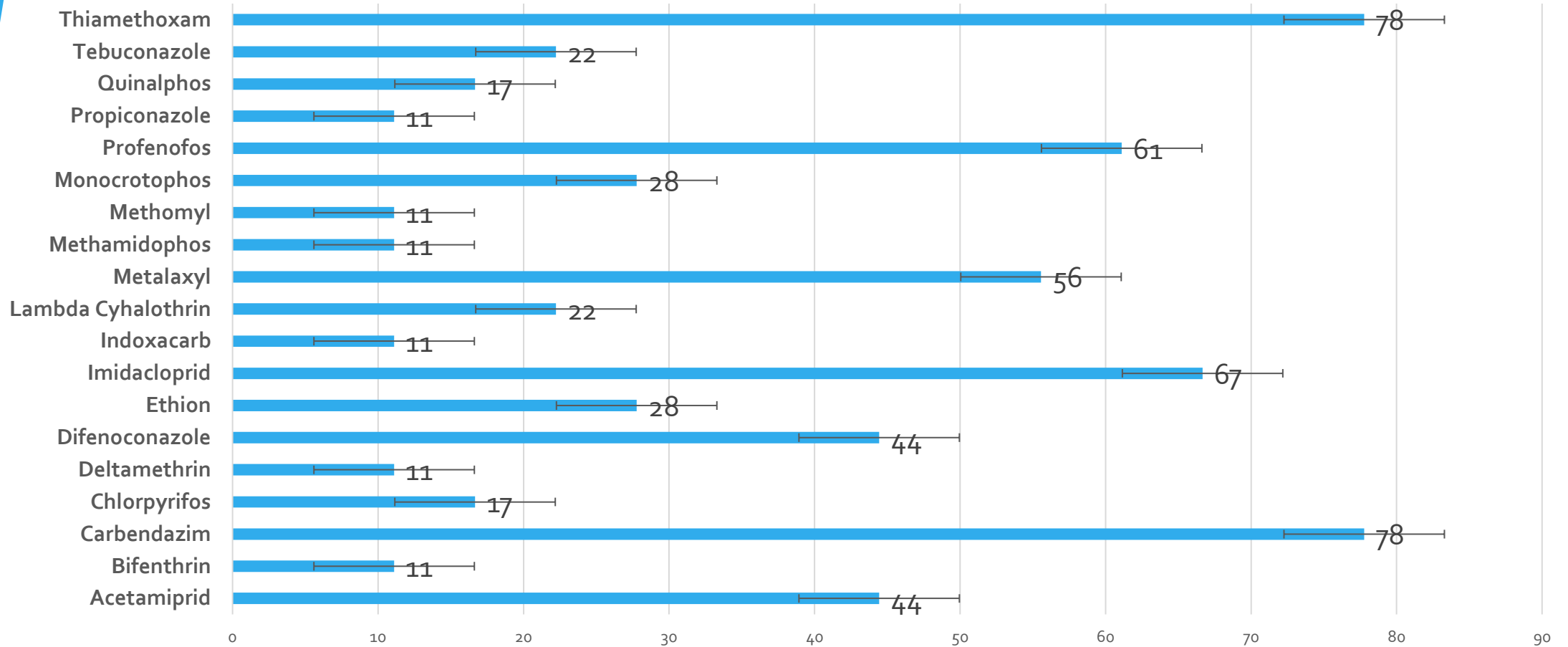
وزارة الصحة العامة
Ministry of Public Health
دولة قطر • State of Qatar



Pesticide Residue Vs Detection %

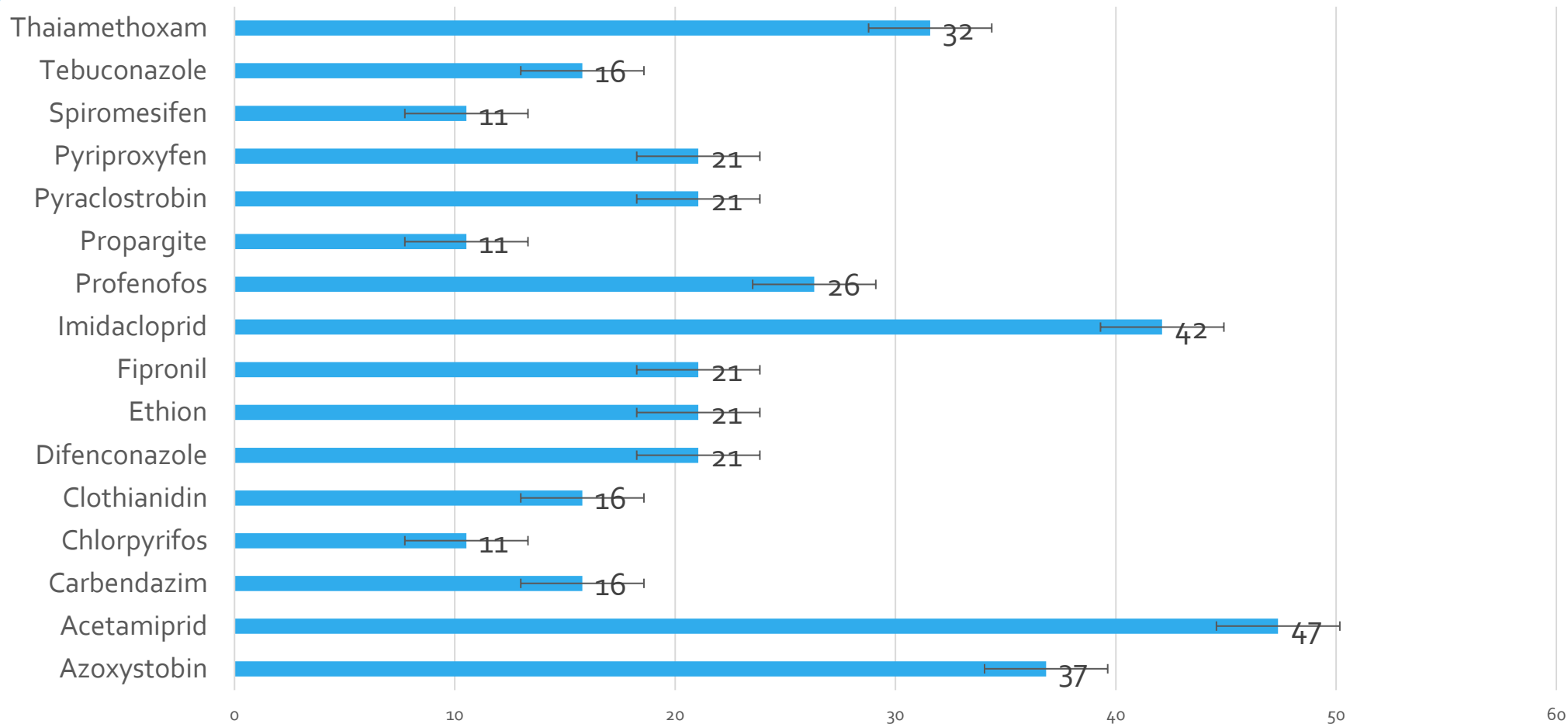
Frequently Detected Pesticide Residue (%) in Cardamom

وزارة الصحة العامة
Ministry of Public Health
دولة قطر • State of Qatar



Pesticide Residue Vs Detection %

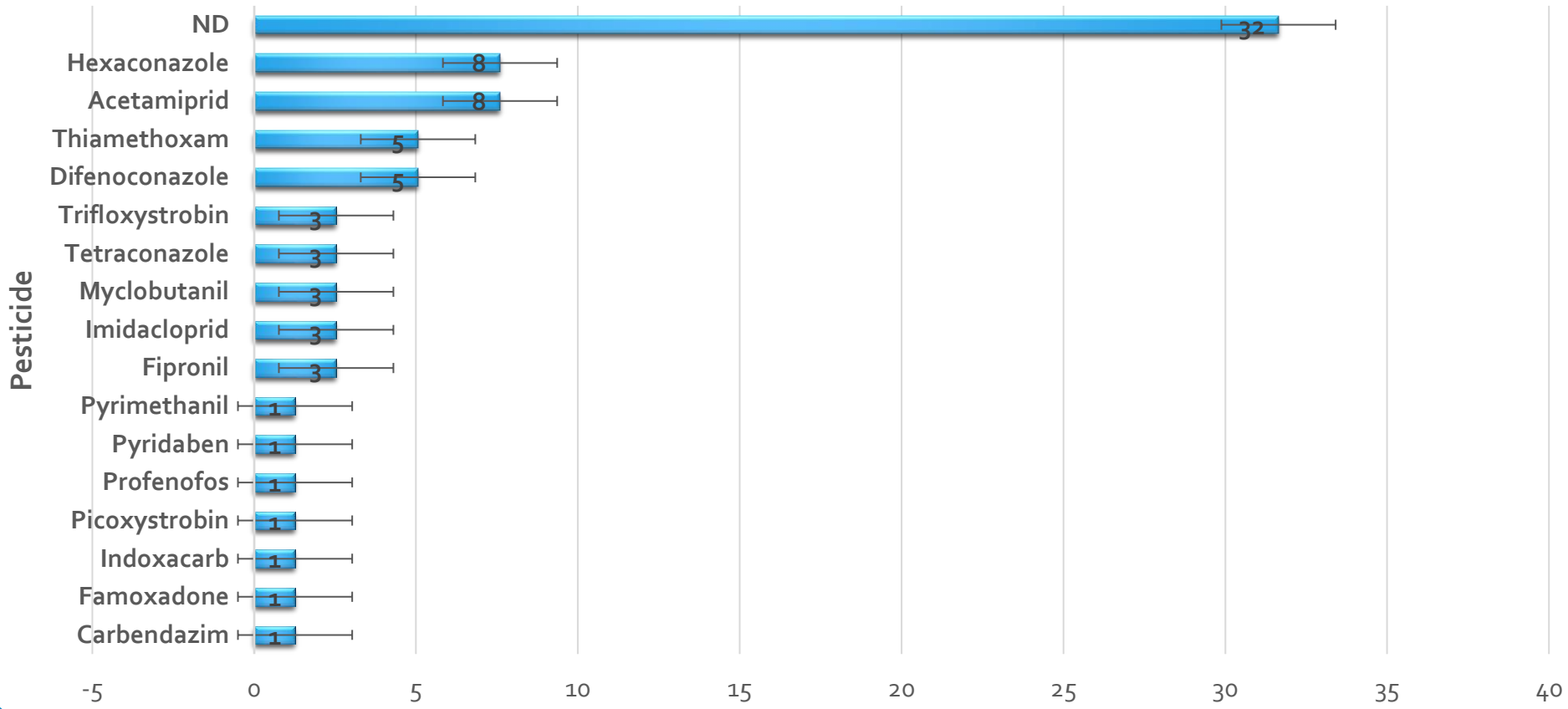
Frequently Detected Pesticide Residue (%) in Green Chili Pepper



Pesticide Residue Vs Detection %

Frequently Detected Pesticide Residue (%) in Grape Leaves & Derived Products

وزارة الصحة العامة
Ministry of Public Health
دولة قطر • State of Qatar



Pesticide Residue Vs Detection %

Pesticide Residue Planned Monitoring Program

Planned Pesticide Residue Monitoring Study	
Year	2023
Total Samples Analyzed	631
No Pesticide Residue Detected %	48
Detected & Complying with MRL %	48
Non-Compliance with MRL %	4
Number of Different Pesticide Residue Compounds Detected	21

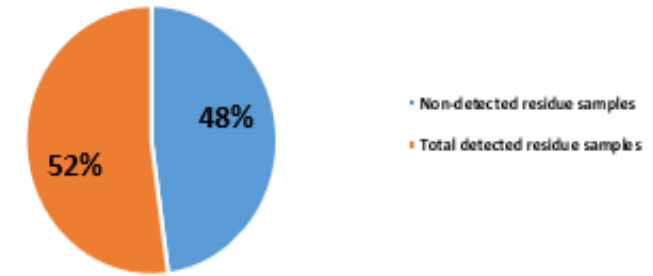


Fig 1a. Percentages of non-detected residue samples and the total detected residue samples

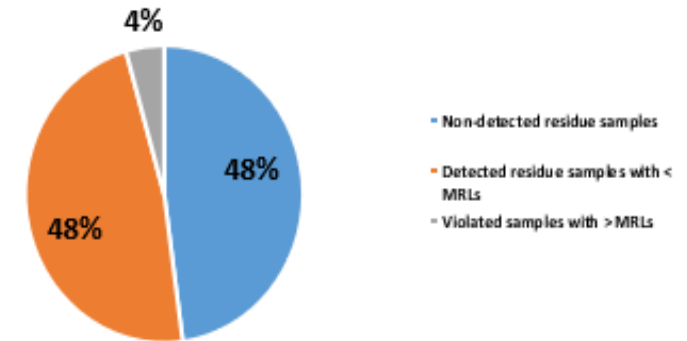


Fig 1b. Percentage of the violated samples from the total number of the investigated samples

Figure 1 (a-b): Occurrence (%) of pesticide residues in the Qatari investigated vegetables

Assigning Maximum Residue Limit (MRL)



GSO

- Compound Vs Specific Commodity (*If MRL not found, then search*)
- Compound Vs Group commodity

Codex

If not found in GSO, Search in Codex

- Compound Vs Specific Commodity (*If MRL not found, then search*)
- Compound Vs Group commodity

EU

If not found in Codex, Search in EU Database

- Compound Vs Specific Commodity (*If MRL not found, then search*)
- Compound Vs Group commodity



هيئة التقييس الخليجية
GCC Standardization Organization

Codex Alimentarius

International Food Standards



Assigning Maximum Residue Limit (MRL)



Search the name of the pesticide residue compound with the name of the food commodity/category.

- If there are no individual limits for the compound with the specific food commodity, then use approved commodity sub-groups in the Codex and GSO standards.

If limits are not available in GSO and Codex commodity sub-groups, European Union pesticides MRL database is referred.



Example for Assigning of MRL



GSO

- **Compound Vs Specific Commodity**

- X pesticide Vs Mango -----→ MRL Not found

- *(Search again)*

- **Compound Vs Group commodity**

- X pesticide Vs Assorted tropical fruits(Inedible peel)---→

Found MRL **Z** mg/kg



Categorization of Vegetables



	Fruiting vegetables (cucurbits)	Fruiting vegetables (Other than cucurbits)	Bulb vegetables	Brassica vegetables	Leafy vegetables	Legume vegetables	Root and Tuber Vegetables	Stalk and Stem Vegetables
	Cucumber	Peppers/ Chili pepper	Garlic	Cabbage	Grape leaves	Beans	Radish	Celery
	Bottle gourd/Bitter gourd/ sponge, wax gourd	Eggplant	Leek	Broccoli	Chard	Peas	Turnip	Artichoke
	Melon	Okra/ Ladyfinger	Fennel bulb	Brussels sprouts	Water cress		Sweet potato, Potato	Asparagus
	Zucchini	Tomato	Spring onion	Cauliflower	Lettuce		Beetroot / Carrot	
	Courgette	Sweet corn	Onion		Mallow			
	Squash	Mushroom			Purslane			
	Pumpkin				Radish leaves			
	Gerkin/Tindly				Spinach			



Categorization of Fruits



Berries and Other small fruits	Citrus Fruits	Pome Fruits	Stone Fruits	Tropical Fruits (Inedible peel)	Tropical Fruits (Edible peel)
Blueberries	Lemon/lime	Apple	Cherries	Custard apple	Date
Strawberry	Mandarin	Pear	Apricot	Avocado	Fig
Gooseberries	Orange	Persimmon (Kaka)	Plums	Banana	Jujube
Grapes	Grapefruit	Loquat	Nectarine	Jackfruit	Olives
Raspberries	Clementine	Quince	Peach	Kiwi	Guava
Currants	Pomelo	Medlars	Prunes	Longan/Litchi	Kaki fruit
Elderberries	Tangerine			Mango	Cashew apple
	Ugli			Papaya	Persimmon
				Pomegranate	
				Pineapple	



Categorization of Herbs & Spices



Herbs	Spices	Dried fruits
Basil leaves	Basil seed	Dried grape (Raisins, sultanas, Currants)
Curry leaves	Fennel seed	Dates
Dill leaves	Anise seed	Figs
Parsley leaves	Cardamom	Sultanas
Rosemary	Cinnamon	
Coriander leaves	Cloves	
Mints	Coriander seed	
Thyme	Cumin seed	
Celery leaves	Pepper	

Current Challenges for Assigning MRL



- Codex is an international food standard. Hence, most of the member countries would apply Codex MRLs for their farm produce prior to shipping the food commodities.
- But there are limitations in Codex Standard database MRLs (Either certain compounds are not present, or commodities are not included).
- When MRLs are not available in Codex, EU pesticide online database is referred.
- EU pesticide database imposes stringent limits for many pesticide residues and MRLs ~ Limit of Quantification (0.01 mg/kg)
- In this context, i.e., when **MRL = LOQ**, the rejection rates are at a higher percentage.

Current Challenges for Assigning MRL



- Example 1 : Ethion in chili peppers (No direct limits in GSO & Codex database), No limits under closest commodity category i.e., **Fruiting vegetables other than cucurbits.**
- Example 2: Azoxystrobin in Pomegranate (No direct limits, No limits under '**Assorted tropical fruits with inedible peel**' but limits are available for another fruit (Banana) under same category.!
- Example 3: Acetamiprid in chili peppers (No direct MRL, Under fruiting vegetables commodity category **MRL = 0.2 mg/kg**, under EU database **MRL = 0.3** i.e., > Codex MRL

Current Challenges for Assigning MRL



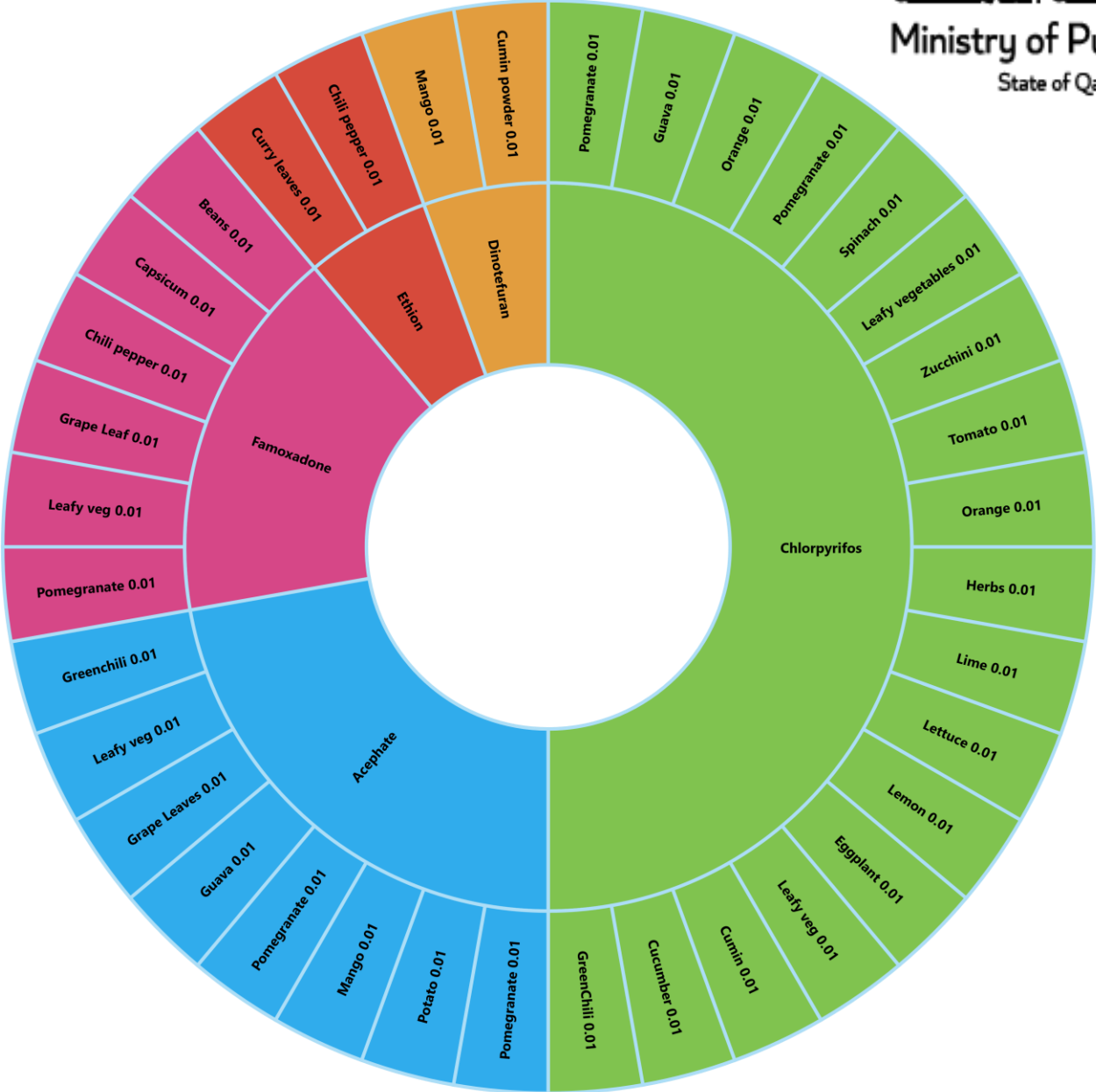
Some pesticide residue with $MRL = < LOQ$ in EU Pesticides Database



EU_Maximum Residue Limit (MRL,mg/kg)

- Acephate
- Chlorpyrifos
- Dinotefuran
- Ethion
- Famoxadone

MRL=0.01
mg/kg
LOQ = 0.01
mg/kg

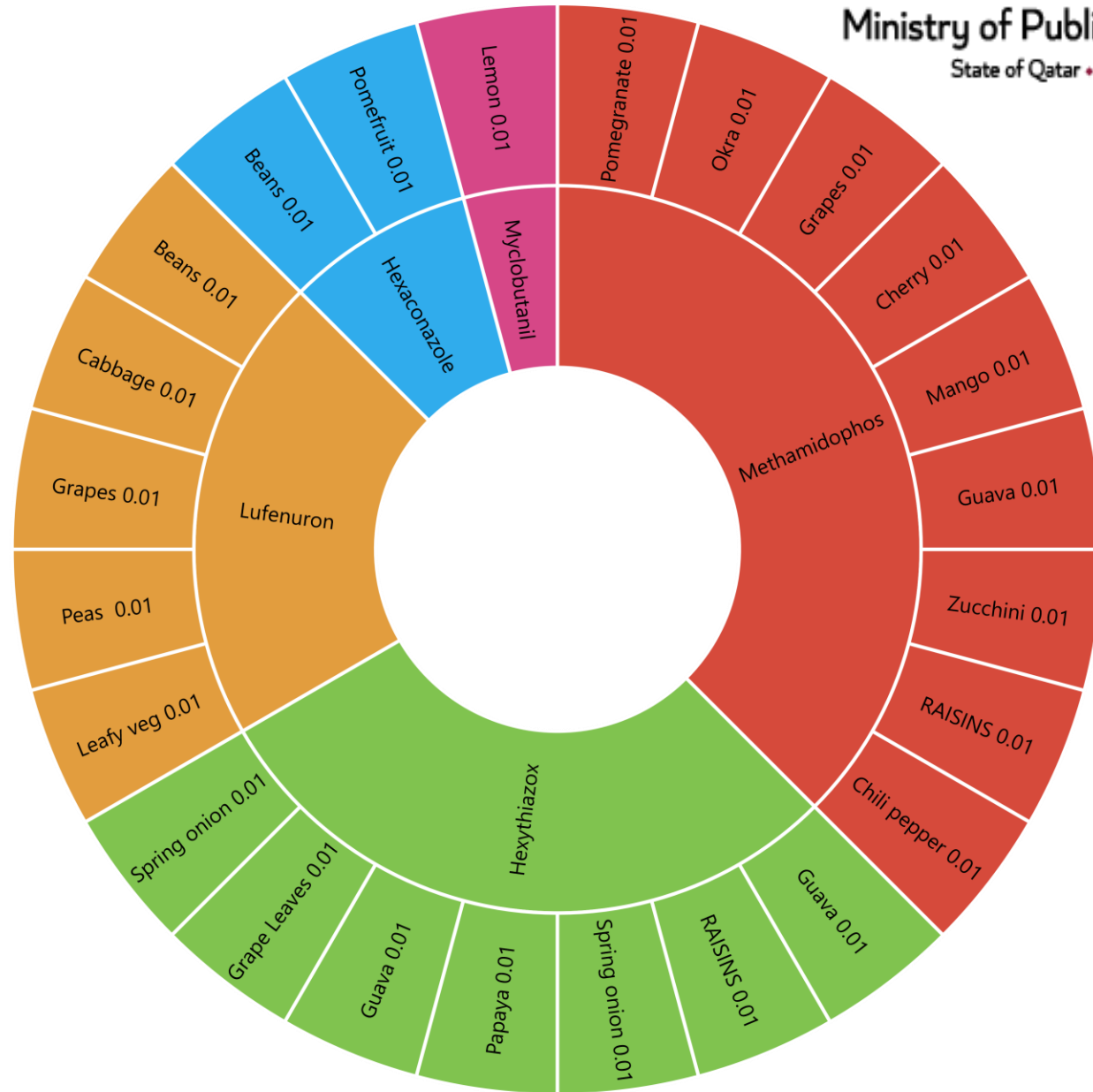


EU_Maximum Residue Limit (MRL,mg/kg)



- Hexaconazole
- Hexythiazox
- Lufenuron
- Methamidophos
- Myclobutanil

MRL=0.01
mg/kg
LOQ = 0.01
mg/kg

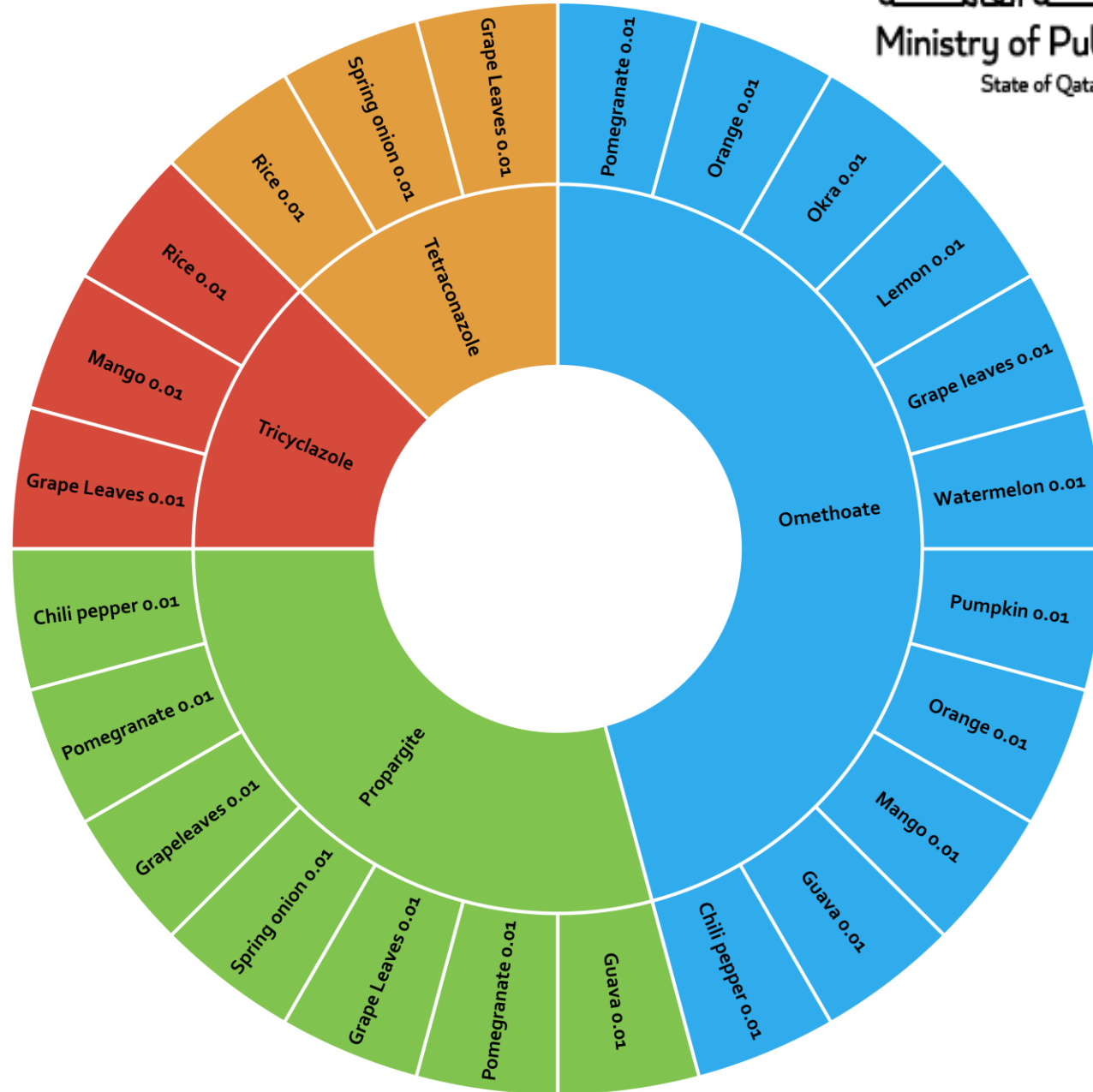


EU_Maximum Residue Limit (MRL,mg/kg)



- Omethoate
- Propargite
- Tetraconazole
- Tricyclazole

MRL=0.01
mg/kg
LOQ = 0.01
mg/kg





Strengthen regional regulations (QSO, GSO etc.) with periodic rigorous review & Create a dynamic MRL database similar to CODEX & EU online database.

Collaborative risk assessment and knowledge sharing with respect to scientific studies dealing with impact of pesticides on public health. Notify CODEX about challenges related to MRLs.

Way Forward

Refer other available international legislations such as EU, US, India, Brazil, Australia MRLs

Improve sampling efficiency at Ports & Conduct retesting for suspected and / borderline rejections. Utilize measurement uncertainties effectively in decision rules.



Pesticide Residue in Food - MRLs and / or Legislation

Country	MRL Source
AUSTRALIA	http://www.foodstandards.gov.au/code/Pages/default.aspx
CODEX	http://www.fao.org/fao-who-codexalimentarius/codex-texts/dbs/pestres/en/
EUROPEAN UNION	https://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/start/screen/mrls
GCC (GSO)	https://www.gso.org.sa/store/
INDIA	https://fssai.gov.in/cms/food-safety-and-standards-regulations.php
USA	https://www.ecfr.gov/current/title-40/chapter-I/subchapter-E/part-180



Thank you...



Presented by

Dr. Gouda Ramadan