




Department
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Risk Based Sampling



International Symposium for
RISK-BASED SAMPLING
June 26-30, 2017 • Baltimore, Maryland



Introduction

- Inspection is important because it is the most commonly used phytosanitary measure (Robert Griffin, USDA)
- The volume and diversity of trade is increasing each year, but there is no corresponding increase in inspectorate resources, therefore further prioritisation will be needed (Osama El Lissy, USDA)
- No trade is zero risk (Javier Trujillo-Arriga, Senasica, Mexico)
- Risk Based Sampling (RBS) describes the use of interception data and statistics to inform where to put inspection effort
- RBS is recommended in ISPM 24 and 31 and is also a requirement of the Trade Facilitation Agreement.
- A range of RBS schemes have been implemented around the world



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European Union examples of risk based sampling

Customised sampling regime for a particular hosts: imports of maple trees into EU

- *Anoplophora chinensis* (citrus longhorn beetle) is an Asian pest of deciduous trees
- The EU introduced revised emergency measures (EU 2010/380/EU) relating to maple trees, *Acer* spp.
- For maples imported from countries where *Anoplophora chinensis* is known to occur, there is a requirement for destructive sampling
- Consignments of 1 - 4,500 trees – 10% trees should be destructively sampled
- Consignments of > 4,500 trees – 450 trees should be destructively sampled



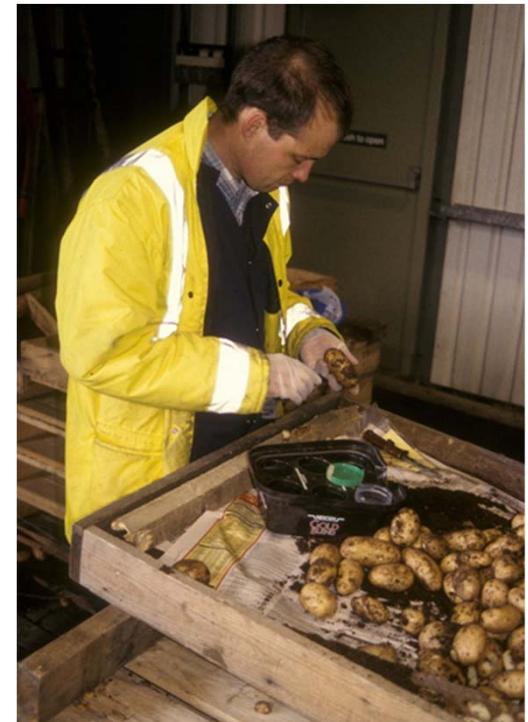
Anoplophora chinensis larva
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European Union (EU) Reduced Frequency of Inspection system (1)

- In the EU there is a list of products that are specifically regulated and require inspection when imported from outside the Union
- The list includes all plants for planting, cut flowers and seeds of certain species, certain fruit and vegetables, and certain categories of timber or wood based products
- Normal regime: 100% inspection of consignments with regulated products
- For fruit/vegetables, wood and cut flowers: the % of consignments for inspection can be reduced, based upon
 - import data,
 - interception records, and
 - estimated mobility of the harmful organism(s)

Reduced Frequency of Inspection (2) (eligibility of trades)

- Trades eligible if >200 consignments imported into EU each year in each of the previous three years
- Interception rate for quarantine organisms has to be lower than 1%
- Request to apply reduced frequency introduced by Member State
- Regime updated every year and in emergency cases.



Plant Health and Seeds Inspector, UK

Reduced Frequency of Inspection (3) (current status)

- 52 trades are covered by the system in 2017 (e.g. *Rosa* from Colombia & Ecuador – 3% inspection rate; apples from the USA 50 % inspection rate)
- Recognises good practice, facilitates trades and reduces costs
- Over 30% of regulated consignments imported to the UK are eligible for reduced checks

Reference:

https://ec.europa.eu/food/plant/plant_health_biosecurity/non_eu_trade/less_frequent_checks_en

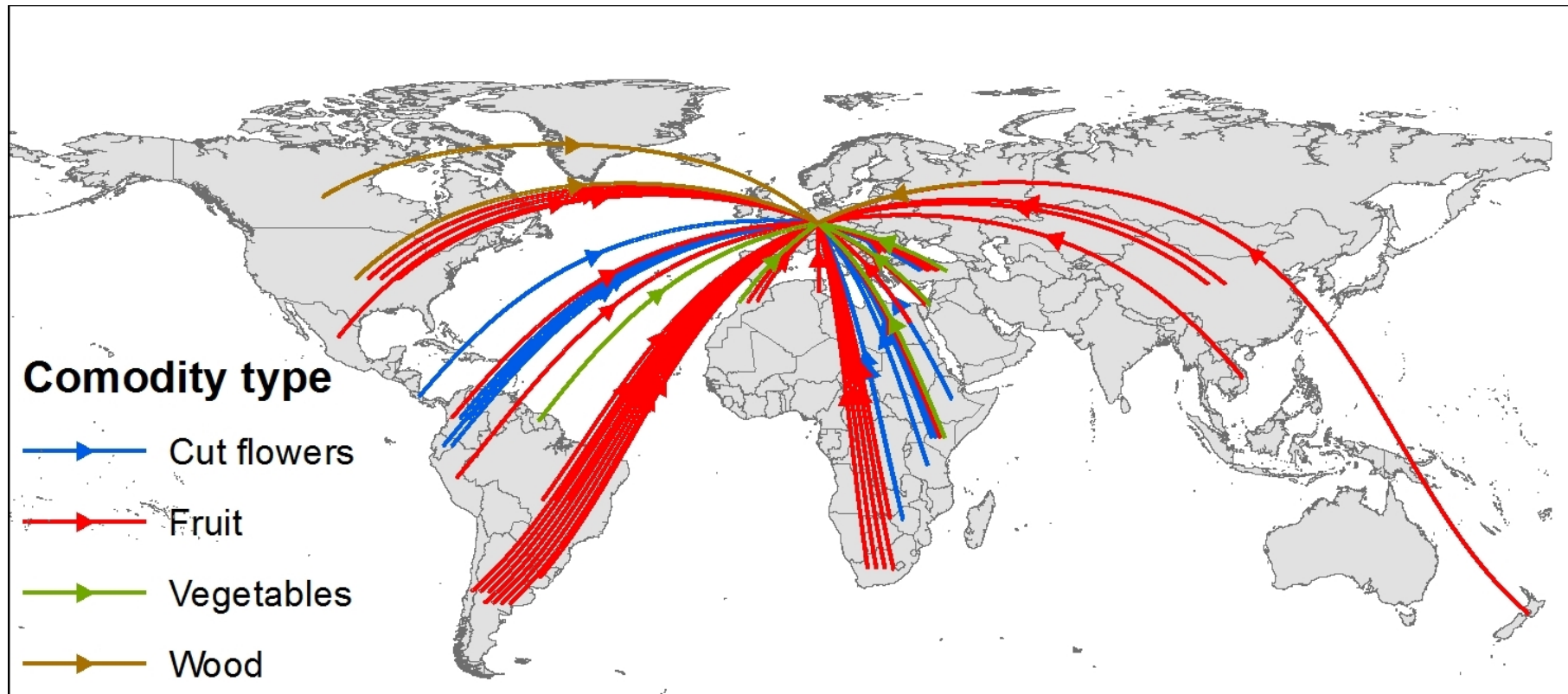


Rosa gallica from Wikimedia (Bogdan)



Pacific Rose apple from Wikimedia (Scarce)

Trades that are part of the EU reduced checks scheme in 2017 (4)

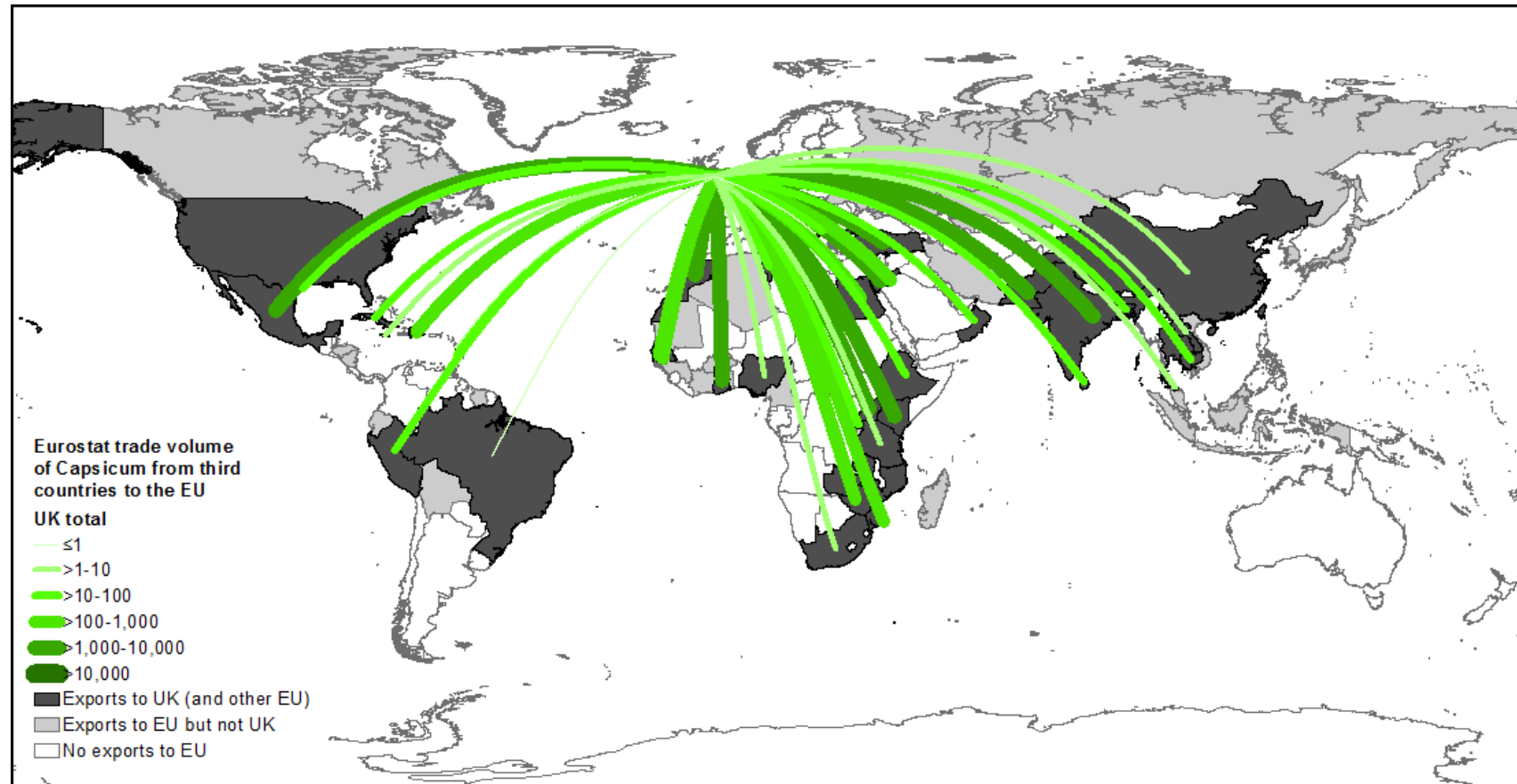




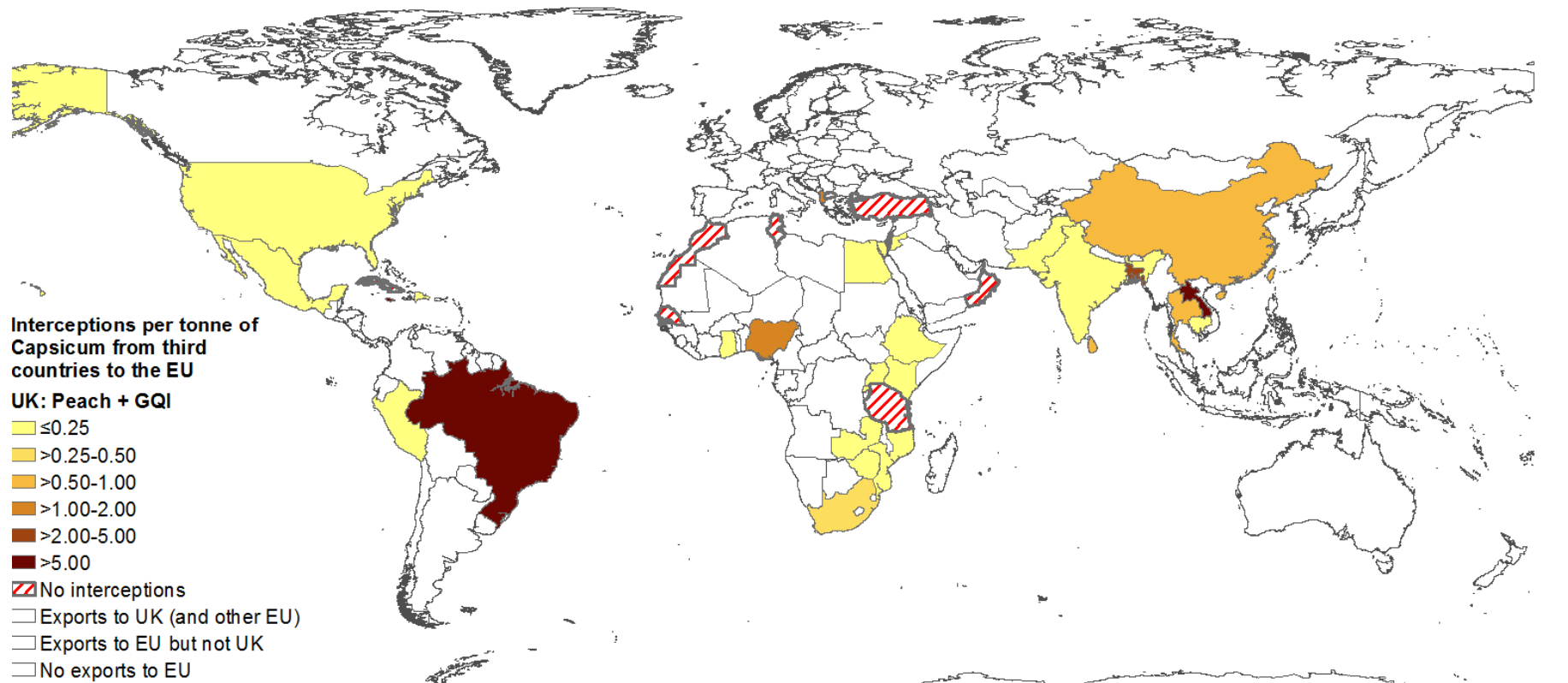
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United Kingdom examples of risk based sampling

Trade pathways are complex: UK imports of *Capsicum* (peppers), Jan 2014 – Mar 2016



One measure of risk: interceptions per tonne of *Capsicum* imports (Jan 2014 – March 2016)



System for prioritising inland inspections in England and Wales (1): the rating system

RISK	1 points	2 points	3 points
Volume of trade	Small	Medium	large
Business Activity	Garden Centre Produce trader Processing business Landscapers Aquatic plant retailers	Production nursery Wholesaler	Propagator Distribution Centre
Origin of plant material	UK	EC	Third Country

System for prioritising inland inspections in England and Wales (2): the rating system

Plant Health Risk Rating	Risk Category	Frequency of visits
3	Low Risk(1)	One visit every 2 years
4	Low Risk(1)	One visit every 2 years
5	Medium Risk(2)	2 visits per year
6	Medium Risk(2)	2 visits per year
7	High Risk(3)	4-6 visits per year
8	High Risk(3)	4-6 visits per year
9	Very High Risk(4)	10-12 visits per year



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Examples of risk based sampling from the 2017 international symposium

Perspectives on inspection (Robert Griffin, USDA)

- **Inspectors** need to understand inspection methods, need to know how their work connects with wider objectives, and need to know why some pests are more important than others.
- **Trade** want to be treated fairly and want to understand inspection rates.
- **NPPOs** will know that different ports have different risks. They need to provide appropriate resources and need good quality data to analyse.
- **Customs** deal with all risks, and plant health is only a small component.
- **IPPC** is trying to fulfil the expectations of Sanitary and Phytosanitary (SPS) measures and harmonise systems.

Hypergeometric Vs fixed proportion sampling from ISPM 31 – confidence in detecting 10 % level of infection

	Hypergeometric sampling		Fixed proportion sampling (2%)	
Lot size	Sample size	Confidence level	Sample size	Confidence level
10	10	1	1	0.1
50	22	0.954	1	0.1
100	25	0.952	2	0.191
500	28	0.952	10	0.655
1 000	28	0.95	20	0.881

Comparison sampling methods (Kathryn Katsar, USDA)

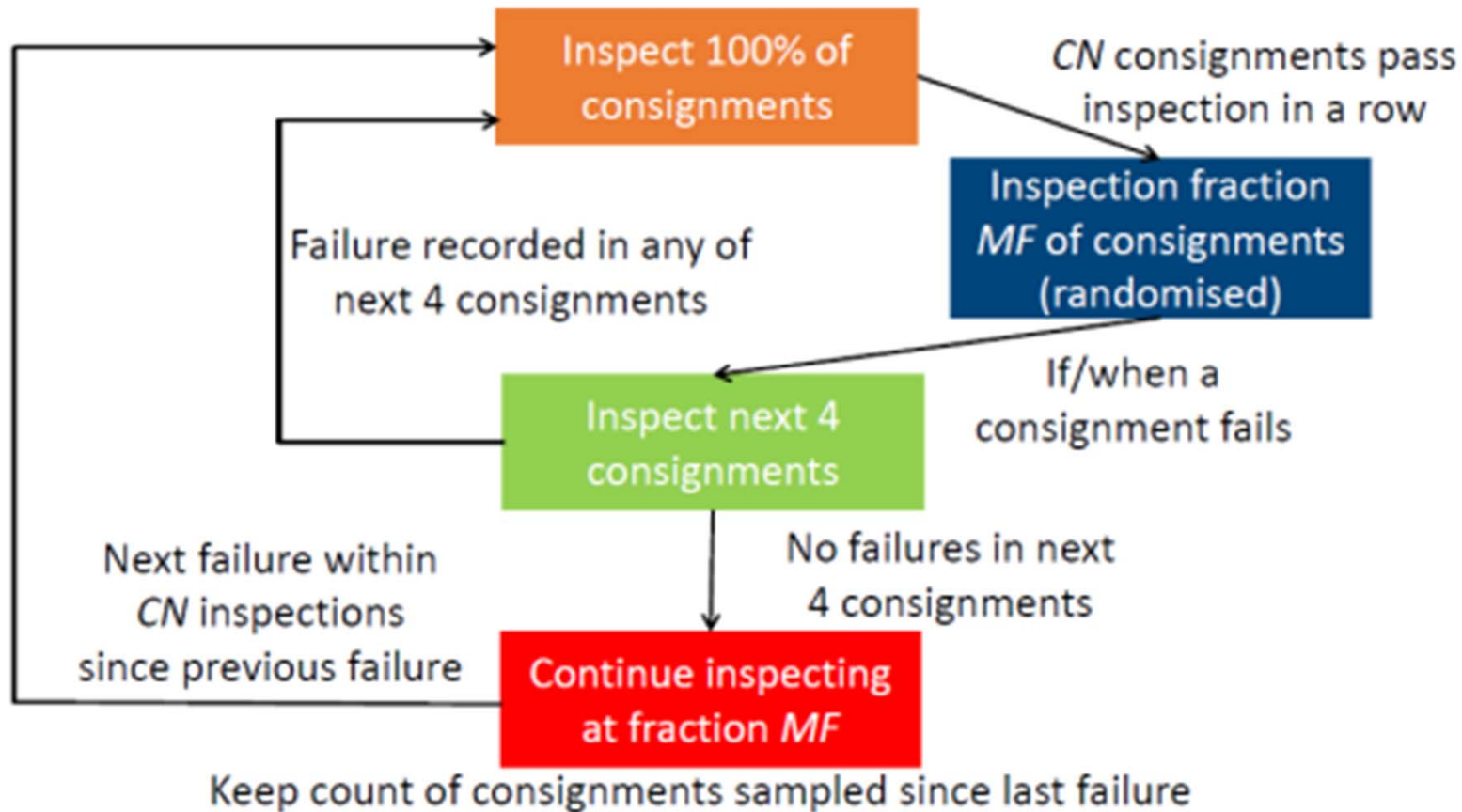
Percentage sampling

Risk-based sampling

Fixed sample size	Fixed risk
Risk is only constant when lot size is constant	Sample size varies with lot size
Sample to first detection	Sample to completion
Influenced by inspector knowledge / perceptions	Independent of human influences
Not technically defensible	Technically defensible

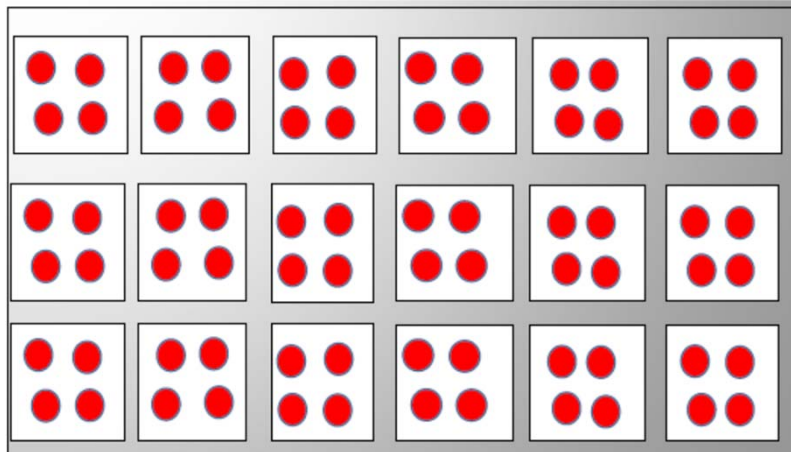
RBS scheme in Australia (Susie Hester, CEBRA)

- CSP- 3 (CBIS)

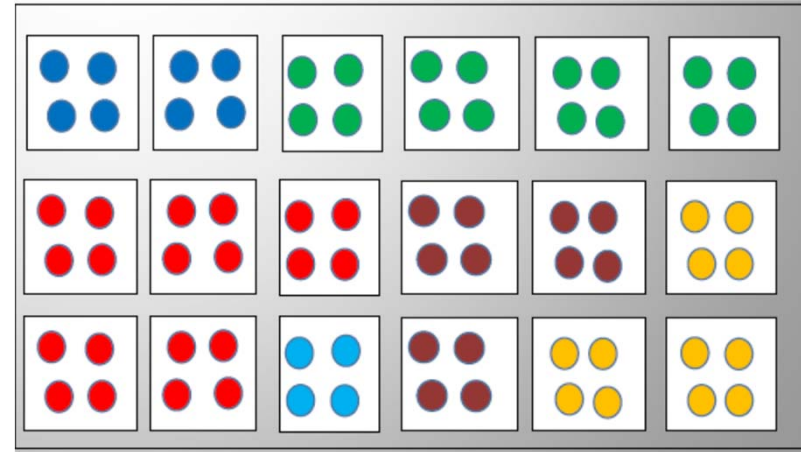


Terminology for plant imports (Marla Cazier-Mosley, USDA)

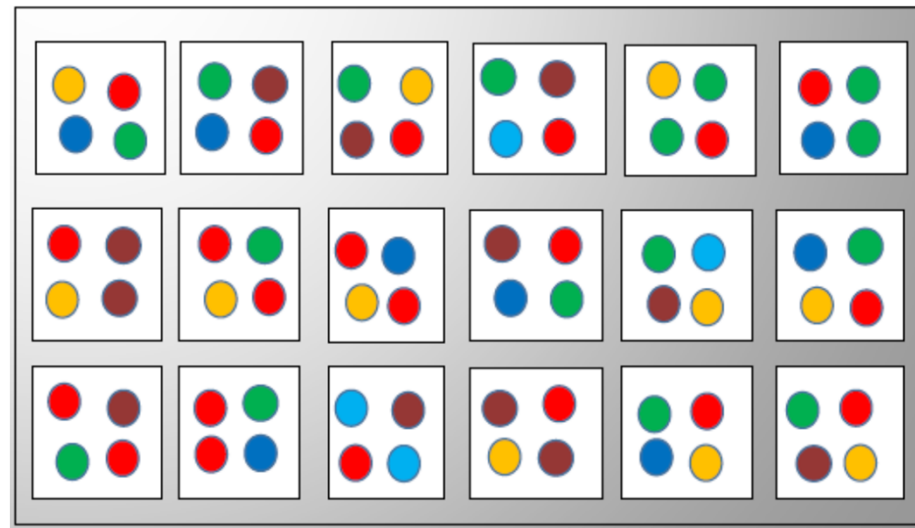
Singling



Mingling



Comingling



Tool to determine which units to inspect for singlings (M.J. Cazier-Mosley, USDA)

Bulk option: use plant unit as sample unit







Inspectional Unit Inputs

(A) Total number of taxa in the inspectional unit	<input type="text" value="1"/>
(B) Total number of sampling units in the inspectional unit	<input type="text" value="18000"/>
(C) Total number of plant units in the inspectional unit	<input type="text" value="18000"/>

Inspected 74 plants
Better distribution



Tool to determine which units to inspect for minglings (M.J. Cazier-Mosley, USDA)

TAXA	# Boxes	# Plant Units	Tool Output per Taxa		
			By box	By baggies	By plant unit
	2	2000	1 box	15	73
	4	4000	1 box	15	73
	5	5000	2 boxes	15	73
	1	1000	1 box	15	71
	3	3000	1 box	15	73
	3	3000	1 box	15	73
Totals:	18	18000	7 boxes (7000 plants)	90 bags (450 plants)	436 plants
Tool output if ran as whole commingled shipment			Boxes: 6 (6000 plants) Baggies: 92 (460 plants)		

Conclusions

- Targeting inspections towards the largest and dirtiest (most heavily infested) shipments, greatly reduces infested plant imports (R. Epanchin-Niell, Resources for the Future)
- The EU's reduced checks system is based on trades (country / commodity combinations) but it is also possible to carry out RBS based on importing or exporting companies.
- To implement RBS, there is a need for data, data analysis, training, communication and consideration of any legislative implications.
- NAPPO are planning to co-ordinate the development of an RBS training manual