



Evaluating a Risk-Based Sampling Inspection Scheme for Plant Pests and Diseases on Mexican Produce Imported by Truck

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for

Port-of-Entry Risk-Based Sampling Cross-Agency Workgroup

USDA, APHIS, Plant Protection and Quarantine
DHS, Customs and Border Protection



Risk-Based Sampling Inspection

- Aims
 - Prioritize inspecting higher risk goods
 - Provide incentives, so importers voluntarily improve quality/reduce non-compliances
- Pros
 - Reduce resources used to inspect lower risk goods
 - (Long term) Change from 2% to hypergeometric sampling
- Cons (chiefly from inspectors)
 - Hypergeometric sampling takes more time (larger n on average)
 - Increased leakage (passing infested lots)
 - Fewer detected pests/non-compliances

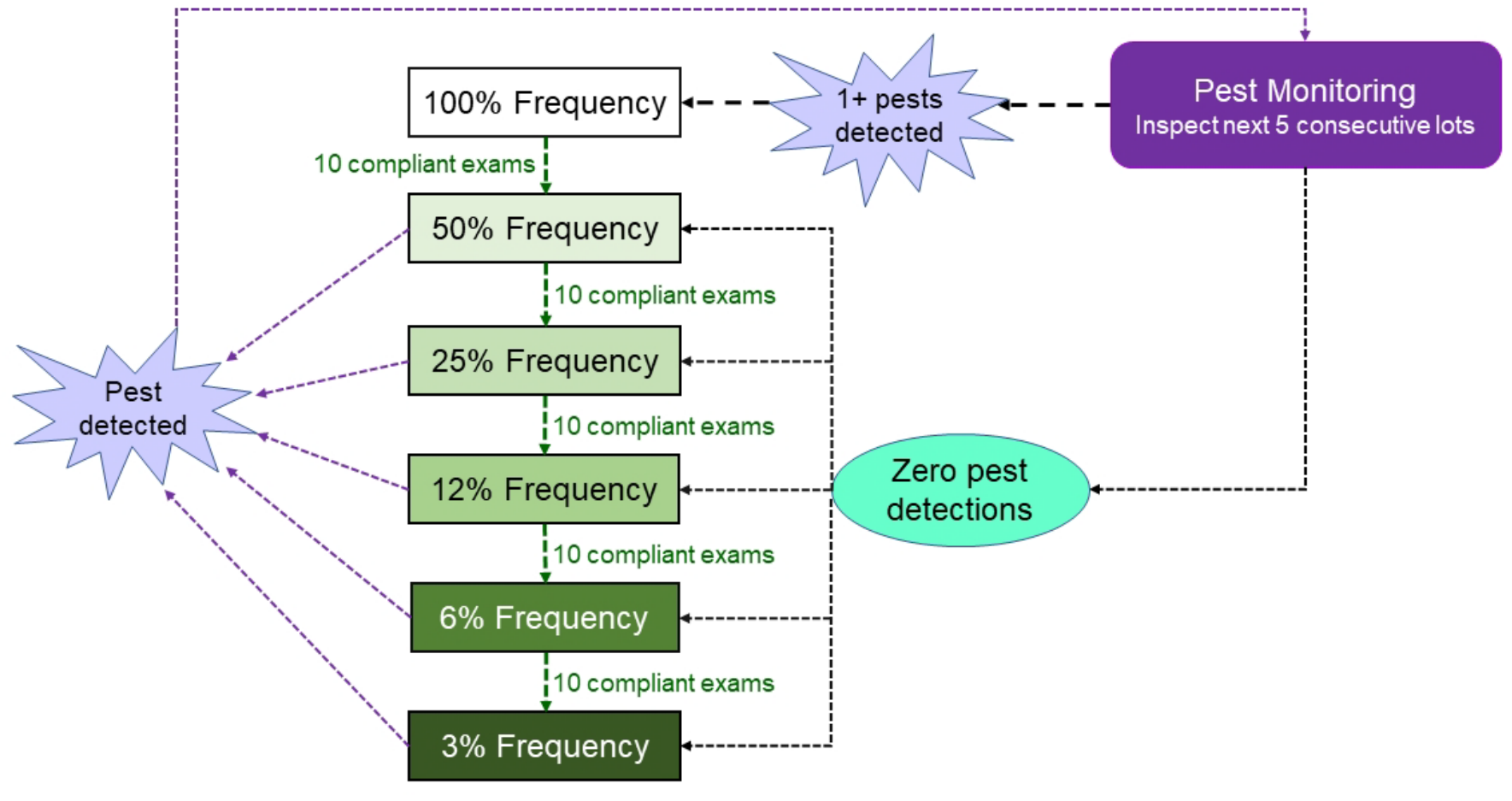


Skip-Lot Inspection

- Sampling
 - Lower frequency of inspection (<100%) for consistently compliant goods
 - No change in intensity of sampling
- Benefits
 - Large potential time savings (document checks; no unloading, etc.)
 - Scheme set to desired average outgoing quality level (AOQL; Stephens, 2001)



Trial sampling scheme





Mexican Produce Trial

- Scope
 - Avocado, Celery, Papaya, Broccoli+Cauliflower (others not reported here)
 - Regions: East (TX) and West (AZ and CA)
- Data coverage
 - Pre-trial: Jan 2017 to entry
 - Trial
 - Avocado/Celery-East: Sept 2018 - Dec 2020 [28 months]
 - Others: Jun 2019 - Dec 2020 [19 months]
- Hypergeometric sampling ($C = 0.95$, $r = 0.10$)
 - $n = 29$ for $N = 1000$





Program management

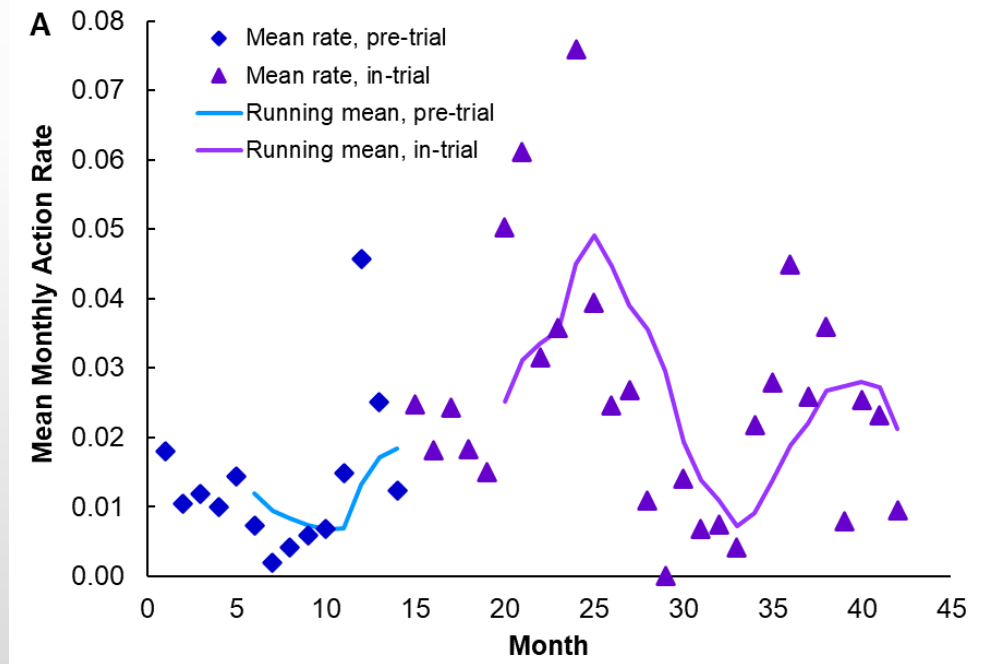
- Pre-arrival
 - Electronic consignment information
 - Identify eligible lots via user-defined customs rules
 - Lots selected for inspection at random or passed, based on RBS status
- Post-inspection
 - Commodity RBS status managed manually
 - Daily updates



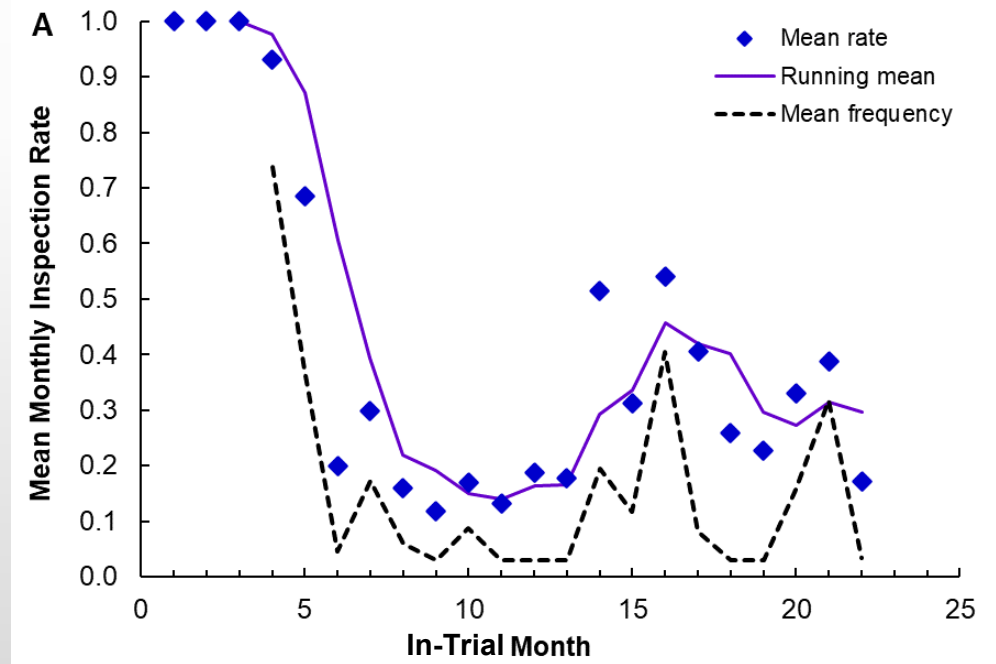


Results: Dynamic action and inspection rates

Action rates, Broccoli+Cauliflower East



Inspection rates, Broccoli+Cauliflower East

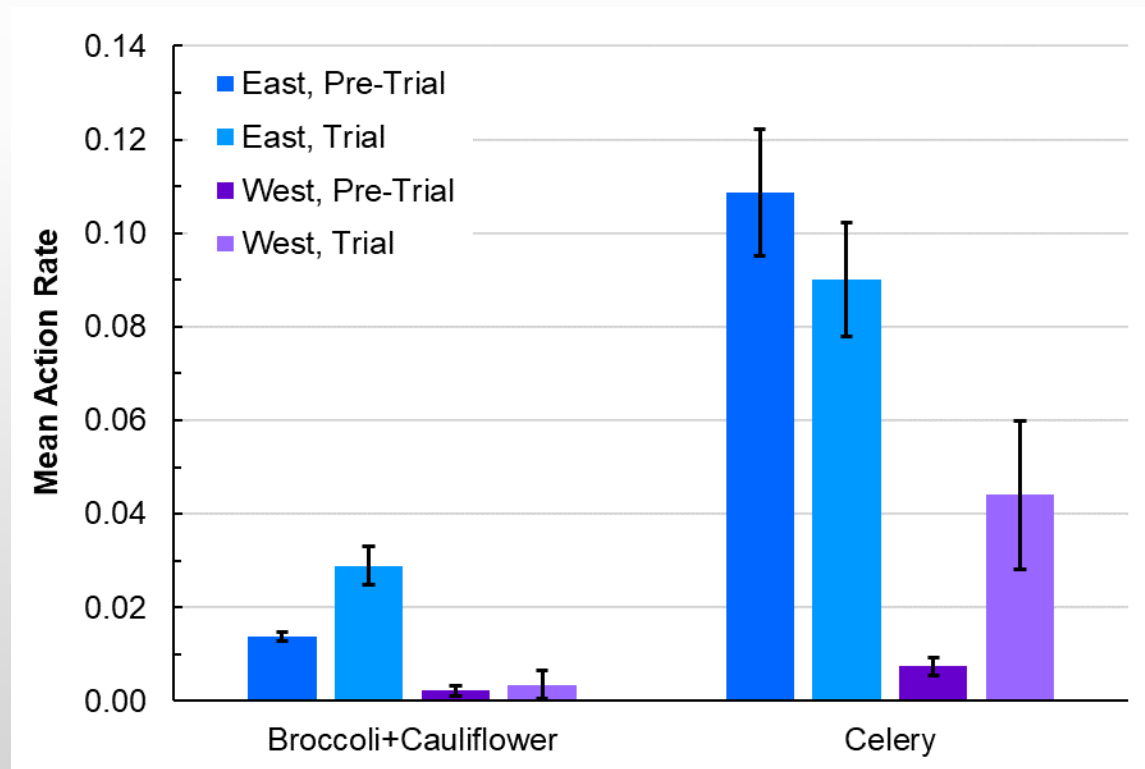




Results: Pest action rates

Concern: “We won’t find as many pests!”

Outcomes: No changes to most but some *increased*





Results: Leakage rates

Concern: “RBS will let pests in!”

Outcomes: Leakage increased—as expected—but only slightly

Commodity	Region	Phase	Leakage rate	Passed lots per leak
Avocado	—	Pre-trial	0.00	—
		Trial	0.0004	2,266.0
Broccoli+Cauliflower	East	Pre-trial	0.0025	400.0
		Trial	0.026	27.1
	West	Pre-trial	0.00	—
		Trial	0.003	318.3
Celery	East	Pre-trial	0.031	32.3
		Trial	0.053	18.8
	West	Pre-trial	0.00	—
		Trial	0.044	18.5
Papaya	—	Pre-trial	0.00	—
		Trial	0.002	466.4



Results: Time savings

Outcomes: Substantial savings, even for most higher risk goods

Commodity	Region	Phase	Mean time (h per mo)	Proportional savings
Avocado	—	Pre-trial	1,661.1	
		Trial	450.8	0.729
Broccoli+Cauliflower	East	Pre-trial	1,219.4	
		Trial	645.5	0.471
	West	Pre-trial	267.9	
		Trial	125.1	0.533
Celery	East	Pre-trial	125.4	
		Trial	160.0	-0.276
	West	Pre-trial	197.3	
		Trial	78.0	0.605
Papaya	—	Pre-trial	272.4	
		Trial	82.7	0.696



Conclusions (1/2)

- Sampling scheme effectiveness and efficiency
 - Concerns were not observed
 - Action rates did not greatly decrease
 - Leakage did not greatly increase
 - Observed time savings of 50–70 percent for most commodities/regions
 - [Not shown] Variable effects on pest taxonomic diversity (one *increase*)



Conclusions (2/2)

- Program management
 - Useful and effective scheme in trial; ongoing “program” now
 - Manually adjusting statuses/targeting rules was effective
 - “Monitoring” scheme was valuable
- Potential improvements
 - Managing status of *producers* probably more ideal
 - Broader use requires technological changes (automation)
 - Enacted by CBP for maritime pineapple from Costa Rica (test case)
 - Ongoing modifications will broaden pathway utility



Thank you and Reminder

- Guidance on creating RBS programs

BP Caton & AP Robinson (2022). How to Design, Implement, and Maintain a New Risk-Based Sampling Program. In *Risk-Based Sampling Manual – Part II* (pp. 48–107). North American Plant Protection Organization (NAPPO), Raleigh, NC, USA