COMPARISON OF DIFFERENT DETECTION METHODS FOR MINIMIZING SAMPLING EFFORTS FOR THE SURVEILLANCE OF XYLELLA FASTIDIOSA

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INTRODUCTION

Xylella fastidiosa long asymptomatic period

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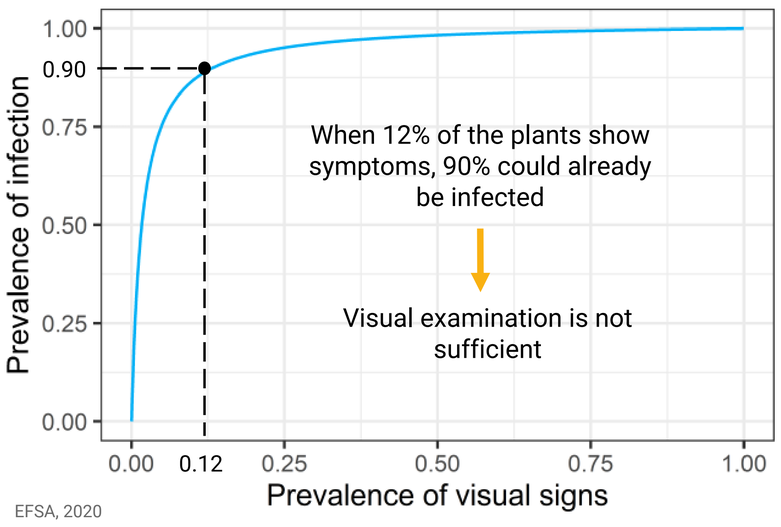
Lower chance of selecting infected samples



EFSA, 2020

Asymptomatic sampling

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Comparison of methods with different sensitivities

Method sensitivity

Overall probability that a truly positive host tests positive

=

Sampling effectiveness x **Diagnostic sensitivity**

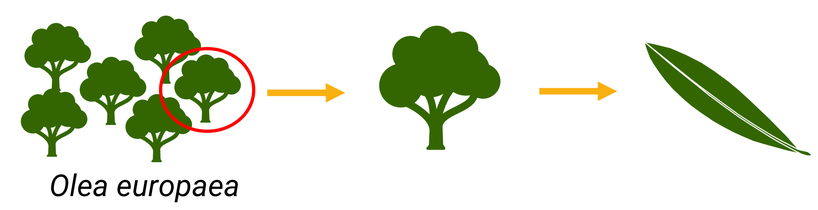
Probability of selecting infected parts from an infected plant

Probability of obtaining a positive test result on a truly infected sample

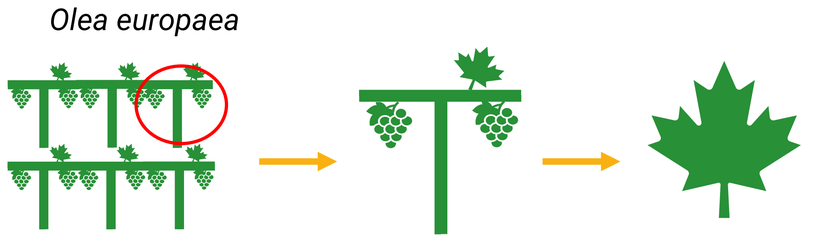
RESULTS

Sample size calculations are conducted using a statistical tool developed by EFSA called **RiBESS+**

Survey 1: Not-risk-based detection survey



Olea europaea



Vitis vinifera

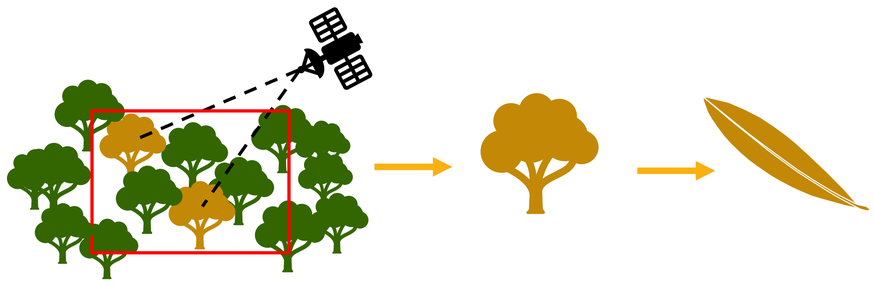
Conventional PCR

Crop	Population size	Diagnostic sensitivity	Sampling effectiveness	Method sensitivity	Confidence level	Design prevalence	Sample size
Olea europaea	1 000 000	0.40	0.70	0.28	0.78	0.01	**540**
Vitis vinifera	500 000	0.60	0.70	0.42	0.78	0.01	**360**
Olea + Vitis	1 500 000	-	-	-	0.95	0.01	**900**

Real-time PCR

Crop	Population size	Diagnostic sensitivity	Sampling effectiveness	Method sensitivity	Confidence level	Design prevalence	Sample size
Olea europaea	1 000 000	0.75	0.70	0.52	0.78	0.01	**291**
Vitis vinifera	500 000	0.95	0.70	0.66	0.78	0.01	**229**
Olea + Vitis	1 500 000	-	-	-	0.95	0.01	**520**

Survey 2: Risk-based delimiting survey



Olea europaea

Olea europaea (1 000 000 inspection units)

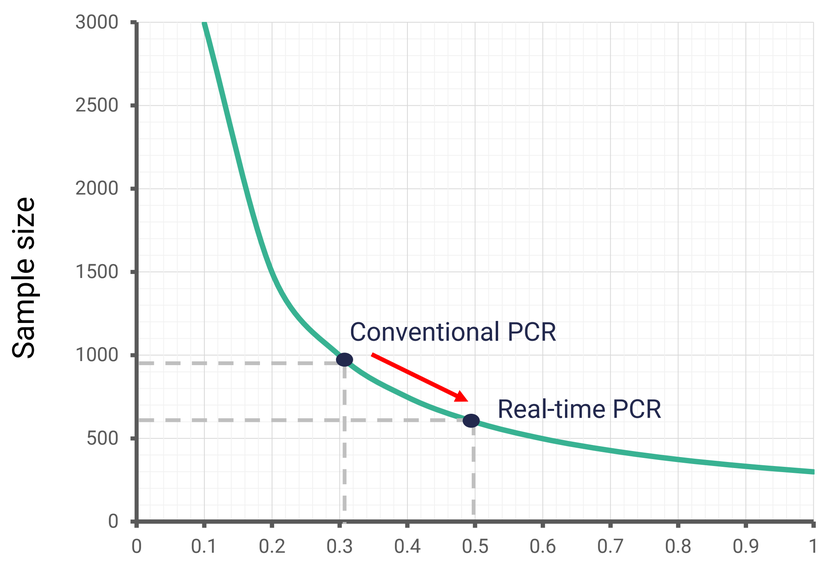
Method	Diagnostic sensitivity	Sampling effectiveness	Method sensitivity	Confidence level	Design prevalence	Convenience sampling HRA:BL	Proportion of population HRA:BL	Sample size		
								HRA (4)*	BL (1)*	Total
Conventional PCR	0.40	0.85	0.34	0.95	0.01	5:1	0.1:0.9	275	55	**330**
Real-time PCR	0.75	0.85	0.63	0.95	0.01	5:1	0.1:0.9	150	30	**180**

* Zarco-Tejada et al., 2018

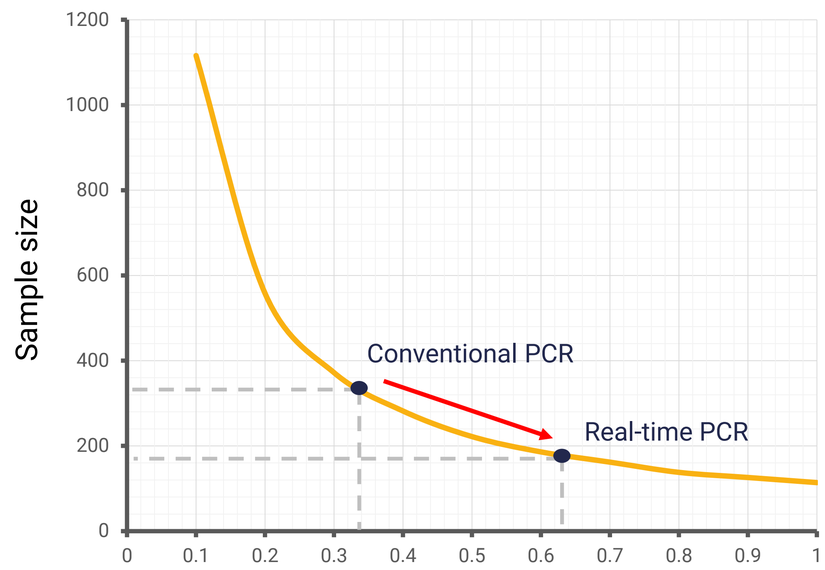
CONCLUSIONS

Detection methods with higher sensitivity minimize sampling efforts for *Xylella fastidiosa*, ensuring robust survey results.

Olea europaea + *Vitis vinifera* (detection survey)



Olea europaea (delimiting survey)



References

EFSA (European Food Safety Authority), Lázaro E, Parnell S, Vicent Civera A, Schans J, Schenk M, Schrader G, Cortiñas Abrahantes J, Zancanaro G and Vos S, 2020. Guidelines for statistically sound and risk-based surveys of *Xylella fastidiosa*. EFSA supporting publication 2020:EN-1873. 76 pp. doi:10.2903/sp.efsa.2020.EN-1873

Zarco-Tejada PJ, Camino C, Beck PSA, Calderon R, Hornero A, Hernández-Clemente R Kattenborn T, Montes-Borrego M, Susca L, Morelli M, Gonzalez-Dugo V, North PRJ, Landa BB, Boscia D, Saponari M and Navas-Cortes JA, 2018. Previsual symptoms of Xylella fastidiosa infection revealed in spectral plant-trait alterations. *Nature Plants, 4*(7), 432.

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