


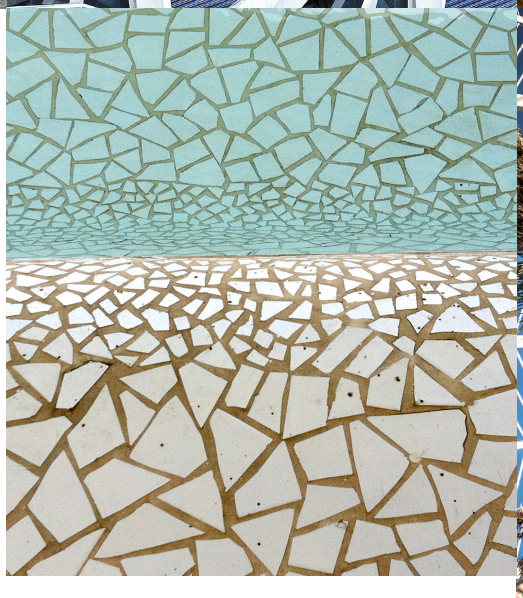

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Development and evaluation of a sequential adaptative sampling strategy to delimiting the distribution of *Xylella fastidiosa*: a case study in Alicante

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Xylella fastidiosa is a phytopathogenic bacterium regulated in the European Union (EU) to avoid its introduction and spread within all Member States. The current legal provisions specify the implementation of an intensive surveillance progam in those regions in which the presence of disease was confirmed. The main aim of this plan is to make an accurate delimitation of the geographic extent of the disease to further implement eradication measures. Alicante, is one of the EU regions affected by *X. fastidiosa*. As a consequence, the area is being subjected to surveillance and sampling actions. Specifically, since the disease was first detected in June 2017 approximately 101,300 has. have been surveyed and around 20,000 samples have been taken and analysed for *X. fastidiosa*. These actions imply a great economic investments, thus can we help risk managers to decide in which areas invest greater effort in surveillance and sampling?, how many samples are necessary to achieve a reasonably accurate delimitation of the extent of the disease?.

Based on 2018 official survey data, different sampling and sampling-surveillance strategies were compared aiming to improve effectiveness. Sampling strategy is based on limiting the number of samples according different spatial resolutions. We implement an algorithm to optimise the cutoff number of samples by simulating differet random sampling scenarios from the reference data. Sampling-surveillance strategy is based on tailoring surveillance and sampling intensity by combining an adaptative approach. The adaptive approach has the purpose of improving the accuracy of the delimitation by exploiting the typical spatial aggregation of *X. fastidiosa*. We suggest a three-phase design in which surveillance and sampling efforts are adaptively allocated in those spatial units where disease has been detected in the previous phase. We implement an algorithm to optimise the number of spatial units to be surveyed and the sampling intensity in each step by simulating different random sampling scenarios from the reference data. Evaluations are quantified comparing the delimitation efficacy and disease prevalence estimates between the proposed strategies and the reference data.

Keywords: Spatial sampling, adaptive sampling, simulation-optimization.