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# Volcanic Soils Are Not Invulnerable: Technical Priorities after the First Detection of Phylloxera in the Canary Islands

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In 2025, grape phylloxera (*Daktulosphaira vitifoliae*) was confirmed for the first time in the Canary Islands, with detections on Tenerife, initially in the Valle de Guerra area and subsequently in other locations such as La Matanza and Candelaria. The detection is important beyond its local relevance. The Canary Islands constitute one of Europe's most visible reservoirs of own-rooted *Vitis vinifera*, with largely ungrafted vineyards, dozens of local varieties, and many old or centenarian vines. This status has historically been associated with the absence of phylloxera, strict restrictions on grapevine imports, and a broader cultural narrative that volcanic soils offered a form of natural protection. The Tenerife case shows that historical absence should not be confused with biological immunity, as in other own-rooted vineyard areas (Chandel et al. 2022).

The most important scientific uncertainty is not simply where phylloxera-positive plants have been found, but what kind of phylloxera population has been detected and whether it is established on roots. Publicly available diagnostic information now points to foliar detection without confirmed radicular establishment. Official surveillance data suggest that the outbreak remains limited but requires sustained attention. By late May 2026, public updates reported 8505 surveys across the Canary Islands, with 8412 locations free of phylloxera; in Tenerife, 7545 surveys had yielded 7452 negative and 93 positive detections. To date, 159 root samples have been analyzed, with no phylloxera detected. Of 60 soil samples analyzed by the Laboratorio Nacional de Sanidad Vegetal e Higiene (LNSVH) of the Spanish Ministry of Agriculture, Fisheries and Food, three initial positive samples from Valle de Guerra coincided with sites where phylloxera had previously been detected on leaves, but these positives were not confirmed in subsequent confirmatory analyses by the regional plant-health laboratory (ICIA). Such results should be interpreted cautiously: they may reflect false positives, highly heterogeneous low-level DNA, or material associated with fallen infested leaves rather than established root-feeding populations. They therefore reinforce the need to distinguish among species detection, radicular establishment, and genotype/biotype characterization.

At present, no public information identifies a common nursery source, cultivar, vine age, or planting-material pathway that links the affected vineyards. This absence of traceback information is itself significant: robust biosecurity requires reconstructing plant-material movements, informal exchanges, machinery routes, and vineyard labor pathways, alongside genotyping of the detected population. These figures indicate low apparent incidence, but not necessarily low risk. Early incursions may remain spatially uneven, biologically uncertain, and highly dependent on movement pathways (Gobierno de Canarias 2026a, 2026b).

The regulatory response has created a framework for containment and eradication. The order of 20 Aug 2025 declared the presence of *D. vitifoliae* in Tenerife and initially established a demarcated area around confirmed outbreaks, comprising an infested zone with a 500-m radius around each infected plant and an additional 1-km buffer zone (Gobierno de Canarias 2025). The order also restricted the movement of grapevine material and fresh grapes; required disinfection of machinery, tools, clothing, and equipment; and provided for eradication measures, including uprooting and in situ destruction of affected vines, soil treatment, phytosanitary treatments in adjacent areas, and reinforced controls on roads and ports. In July 2026, following the 2026 surveillance campaign, the Government of the Canary Islands announced a modification of the order that redefined the demarcated

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area as a 50-m infested zone around each positive detection, a special-surveillance zone extending to 500 m, and a 2-km buffer zone. The modification also relaxed some restrictions on the movement of fresh grapes and plant material in pest-free areas while maintaining restrictions where a risk of dispersal persists, and reinforced surveillance within the demarcated area (Gobierno de Canarias 2026c).

Comparable risk conditions are known from regions where phylloxera is absent, limited, or highly regulated, including parts of Chile, the United States, and Canada; high-sand areas in South and Western Australia; and some island vineyards. These regions do not remain secure because of a single protective factor; rather, they combine varying degrees of geographic isolation, biosecurity, soil texture, climate, nursery control, and regulation of plant movement. The Canary Islands therefore offer a warning for other phylloxera-free or phylloxera-limited regions: protection depends less on any single environmental factor than on sustained biosecurity, traceability, and early detection.

There is no curative chemical control for grape phylloxera. Insecticides may temporarily suppress populations but they do not eradicate the insect and should not be presented as a durable solution. Long-term management rests on preventing further spread, identifying the biotype or genotype involved, using certified and traceable plant material, strengthening nursery systems, and where necessary, grafting *V. vinifera* onto tolerant American rootstocks (Granett et al. 2001, Hoheisel and Moyer 2026). This does not mean that historically ungrafted regions should respond by immediately grafting in all vineyards; rootstock transition should be risk-based, gradual, and supported by conservation of local germplasm.

The Tenerife case also shows why common wine descriptors can mislead technical decision-making. "Volcanic soil" is a geological and viticultural descriptor, but not by itself a phytosanitary risk category. For phylloxera, the relevant variables are more specific: soil texture, especially sand and clay fractions, together with structure, aeration, moisture, irrigation, and temperature. Local wine discourse has often linked the historical absence of phylloxera to volcanic soils, but this explanation should be treated cautiously. A more plausible interpretation combines geographic isolation, phytosanitary restrictions, limited historical importation of grapevine material, and site-specific soil conditions. Further historical work on port controls, nursery trade, enforcement, and informal plant circulation would help clarify how this absence was maintained.

The distinction between volcanic origin and soil texture is central for current management. Soil texture remains important but its relevance must be framed correctly. Sand content, clay content, soil structure, moisture, aeration, irrigation, and temperature are most directly relevant to the survival and spread of the root-feeding form of phylloxera. If current detections are limited to foliar forms, soil texture alone does not explain the initial incursion. Rather, soil texture helps identify where future radicular establishment would be more or less likely if root-feeding populations emerge or are later detected. Existing risk frameworks show that higher sand content reduces phylloxera survival and spread, while finer, clay-rich soils tend to increase vulnerability. Drawing on previous research, Chandel et al. (2022) applied a practical threshold approach for risk mapping, classifying soils with more than 80% sand as low risk, 65 to 80% sand as moderate risk, and less than 65% sand as high risk. Temperature then modifies this texture-driven baseline. At ~20 cm depth in summer, soil temperatures below 18°C or above 27°C represent lower-risk conditions, whereas 18 to 27°C is more favorable to phylloxera development (Chandel et al. 2022).

ISRIC SoilGrids profile data illustrate why site-specific assessment is needed (Poggio et al. 2021). In the illustrative SoilGrids profiles shown in Figure 1, the Lanzarote point averages ~50% sand, whereas the Valle de Guerra point in Tenerife averages ~33% sand and has a higher clay fraction. This is relevant because Valle de Guerra combines warm conditions, intensive agriculture, and finer-textured soils more favorable to phylloxera when summer soil temperatures fall within the insect's thermal range. The comparison with very high-sand phylloxera-free areas is instructive. Even the arid eastern islands of Lanzarote and Fuerteventura may not reach the sand thresholds that would justify assumptions of protection. Aridity and volcanic origin should therefore not be read as immunity.

A first operational risk map for the Canary Islands need not be complex. It could combine four layers: vineyard location, sand:clay ratio, mean summer soil temperature at ~20 cm depth, and current delimitation data from official surveys. Additional layers could be added progressively, including irrigation, nursery supply routes, machinery-sharing networks, harvest logistics, and movement authorizations. Open soil-texture and soil-temperature data sets could provide a preliminary framework to be refined with local field measurements. The purpose would not be to predict phylloxera spread with false precision, but to prioritize surveillance, sampling, movement controls, and long-term rootstock planning. Nevertheless, soil risk maps should be considered complementary, not sufficient. Extensive ground surveys should be the first priority to determine where phylloxera is established and to delimit further spread from known infested areas.

These surveys should be repeated over consecutive seasons to estimate the rate of spread and to detect whether root-feeding populations emerge. Surveys should integrate foliar inspection, root inspection where appropriate, soil and plant sampling, laboratory confirmation, and georeferenced recording. The March 2026 government update indicated that the current operation includes surveys inside and outside affected zones, soil and aboveground samples for laboratory analysis, treatments of affected plants and their surroundings, and destruction in situ of infected vines.

The second priority is biosecurity. Phylloxera is not moved solely via propagation material. It can also be transported on agricultural machinery, footwear, clothing,

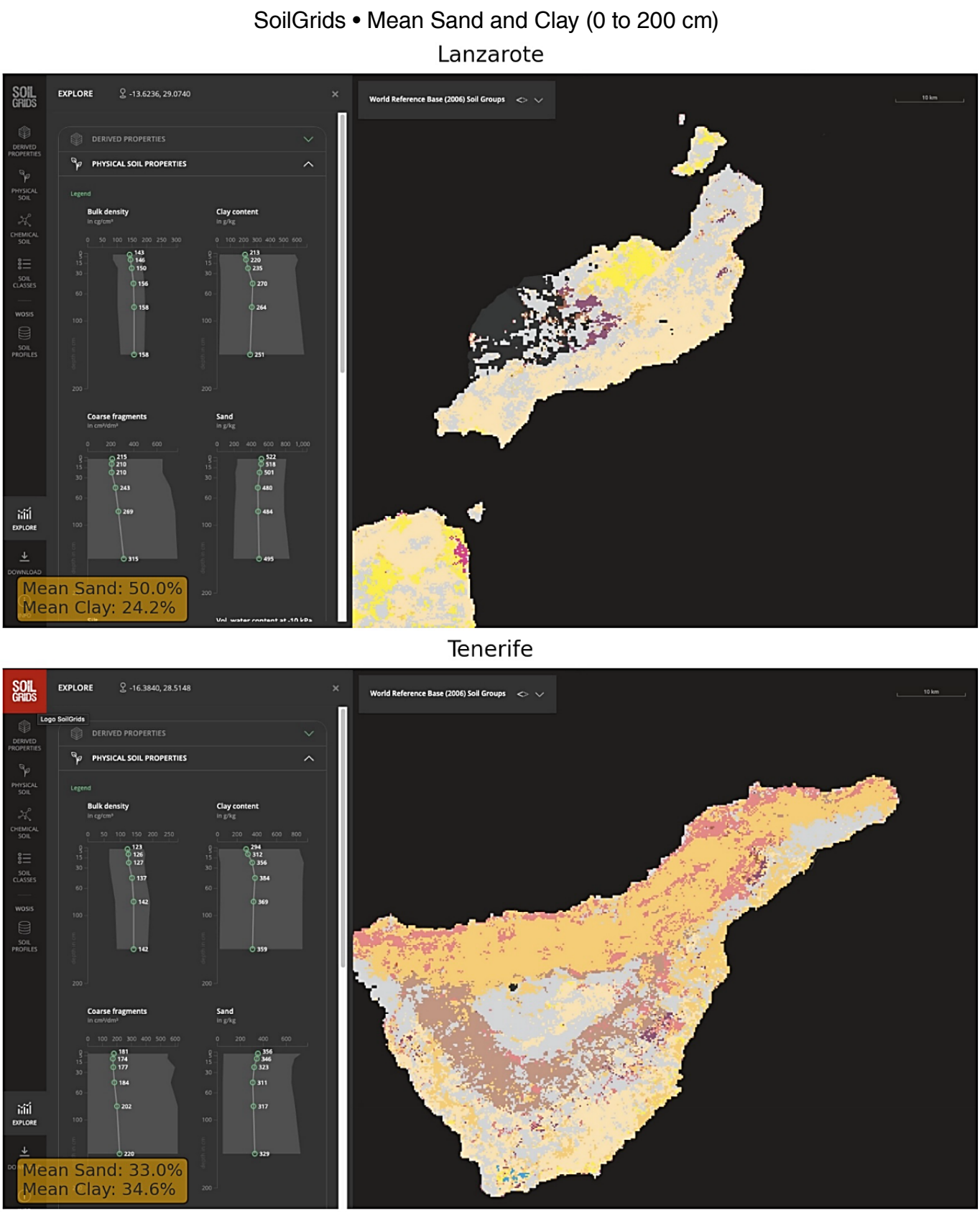


**Figure 1** Composite image made from data from ISRIC SoilGrids showing Lanzarote versus Tenerife. These are point-based profile means rather than island-wide spatial averages and are simple averages across the six standard depth layers (0 to 5, 5 to 15, 15 to 30, 30 to 60, 60 to 100, 100 to 200 cm). As modeled predictions (250-m resolution), they may differ from local ground surveys. Profile values are shown on the left panels (units converted from g/kg to %). Currently, no general maps based on ground surveys exist beyond specific site data for the islands.

vehicles, tools, harvest containers, and soil attached to equipment. The pruning-period protocols announced in January 2026 address movement of grapevine material; management of pruning residues and other green waste; and biosecurity measures in plots, machinery, personnel, and materials. These measures should be communicated in a way that distinguishes high-risk pathways (e.g., vine wood, rooted plants, nursery plants, soil-contaminated equipment, footwear, and tools) from lower-risk movements that can be managed under authorization, traceability, and hygiene controls.

The nursery system should become a central part of the response. In a territory where vineyard value lies partly in own-rooted status and varietal diversity, the goal should not be a blanket and immediate shift to grafting. A more balanced strategy would combine certified phylloxera-free propagation, strict traceability of plant material, quarantine for new introductions, genotyping of detected populations, and repositories for local germplasm in consistently low-risk areas. Rootstock transition should then be targeted first to high-risk zones, particularly where finer-textured soils, suitable temperatures, irrigation, and movement pathways overlap. This would allow the islands to reduce vulnerability while conserving their distinctive ungrafted heritage.

The broader lesson is that biosecurity in viticulture requires continuous surveillance; traceable plant movement; coordination among nurseries, growers, wineries, and authorities; and the capacity to adapt protocols as biological evidence improves. For historically ungrafted regions, the Canary Islands case shows that the key question is no longer whether phylloxera can arrive, but how quickly a region can delimit, characterize, contain, and adapt once it does. The technical priorities are clear: multiseason surveys, confirmation of the biotype or genotype involved, strict control of high-risk movement pathways, risk mapping for potential radicular establishment, phylloxera-free propagation systems, and targeted rootstock strategies that protect both production and grapevine heritage.

## CRediT Authorship Contributions

PAG: Data Curation, Investigation, Writing – Original Draft; PAG, EPD: Conceptualization, Writing – Review & Editing; EPD: Funding Acquisition, Resources

## Conflict of Interest

Pablo Alonso González participates in the emergency committee convened by the Government of the Canary Islands on grape phylloxera.

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## Data Availability

The data underlying this study are available on request from the corresponding author.

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