

Summary of: Stability of African Swine Fever Virus in soil and options to mitigate the potential transmission risk

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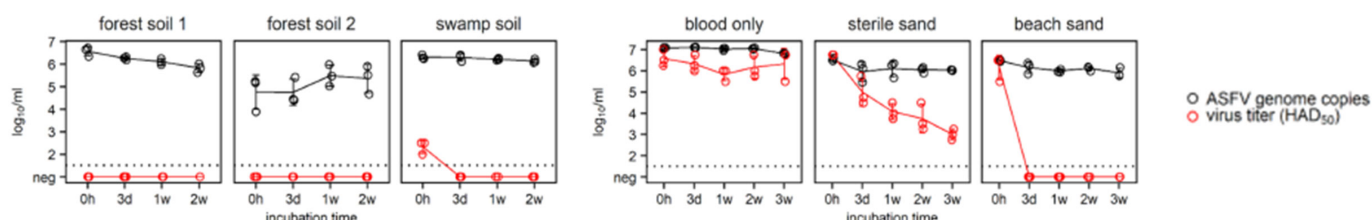
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African Swine Fever Virus (ASFv) causes a viral hemorrhagic fever in swine. Although this virus can be found endemically in Africa and parts of Europe where African wild boar and feral swine serve as asymptomatic carriers, domestic pigs are also susceptible. Since its discovery in China in commercial pig populations in 2018, ASFv has spread to other countries in Asia with a devastating impact on swine industry and economies. Since then, more fervent research aiming at prevention and mitigation of ASFv has been pursued. It is known that ASFv can survive for an extended period of time in the environment, infected carcasses, and infected animal products, but not much data is available for virus survivability in soil. In this study, researchers aimed to determine the survivability of ASFv in soil under an infected carcass, in an effort to mitigate the spread.

Different types of soil from five locations in Germany were collected based on where wild boar are commonly found: yard soil, two types of forest soil, swamp soil, and beach sand. Each of these soil types in addition to sterile sea sand and no soil control were spiked with ASFv and kept for two weeks at room temperature. The infected blood used was collected from experimentally infected wild boar with ASFv “Armenia08”. At time points 0, 3, 6, 24, 48, and 72 h, and at 1 and 2 weeks following spiking of the samples, blood and soil samples were tested for the presence of ASFv using PCR, and the amount of hemadsorbing doses (HAD₅₀) per mL – a measurement of virus traditionally used to experimentally infect pigs with ASFv in research settings.

Another set of soil samples were infected were spiked using a recombinant ASFv-Kenya1033ΔCD2vdsRed. This allowed the virus to fluoresce red under the microscope. Beach sand, commercial potting soil, sterile sea sand, and a no soil control, were spiked with ASFv, and kept at room temperature and tested at 1 and 3 h, 1 and 5 d, and 1, 2, and 3 weeks. Each of these samples were treated with either 3.5% or 7.0% of calcium hydroxide or citric acid for 1 or 3 h and tested for ASFv presence and titer levels.

The study found that in all samples for all time periods, ASFv genome could be detected. Infectious ASFv was found in sterile sand for at least three weeks, beach sand for up to two weeks, yard soil for one week, and swamp soil for three days. No infectious virus was found in two forest soil samples, even after being spiked. Both treatments of calcium hydroxide and citric acid resulted in complete inactivation of the virus after 1 hour. Researchers determined that soil pH, structure, and ambient temperature were all factors that affect virus stability. As noted by the results, more acidic soils decrease the stability of ASFv, as compared to sandier soils, and both citric acid and calcium hydroxide are an effective treatment option for the inactivation of the virus in a variety of soil types.



The results of this study contradict previous research that showed quick inactivation in water, soil, and leaf litter. It was noted that a possible reason for this contrast is the ratio between soil weight and infectious blood volume that was used. Therefore, it would be important to note that this ratio may be different under natural conditions, especially as it relates to disinfectant efficacy. As expected, the virus genome could be detected over the entire period of sampling. The HAD₅₀/mL was determined at each time point, but this measurement may not be equivalent to when this virus remains infectious in vivo, especially since hogs have a natural rooting behavior.

Altogether, these findings indicate that further investigations into the use of disinfectants for the treatment of soil where infected or possibly infected carcasses were held, especially in different geographic locations where the soil content and makeup may differ.

Full article can be found at: DOI: <https://doi.org/10.3390/pathogens9110977> or <https://www.mdpi.com/2076-0817/9/11/977>