The effect of different foundation systems on the fungal flora in the crawl space of a new wooden Japanese house

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In order to establish novel preventive measures against damage of wooden houses by decay fungi with less chemical, we periodically monitored the fungal flora in two different foundation systems in the crawl space of an experimental Japanese house.

Either a layer of concrete or just soil as the foundation system were employed, and moisture content of foundation timbers, temperature and humidity of the crawl space were measured. Fungi were sampled by the following methods: a) from the crawl space atmosphere with a PDA plate, b) from foundation timbers with a soft plastic tape, and c) from small wood blocks laid on a layer of concrete or on soil. Visually pre-identified basidiomycetes were served for further DNA analyses. A decay test was conducted with these fungi: 16 white rot fungi and a brown rot fungus.

Numbers of fungal colonies in the concrete section were significantly lower than those in the soil section. The soil section generally showed higher humidity and moisture content of foundation timbers than in the concrete section. These findings suggested that the soil strongly influenced the water condition of the crawl space, indicating the higher decay risk in the soil section.

To analyze the effect of air flow on the fungal flora, all ventilation slits were air-tightly closed with an aluminum tape. This resulted in higher numbers of fungal colonies, humidity and moisture content of foundation timbers in the soil section (Table1.). These results indicate that the ventilation is indispensable for a house with a soil foundation system to reduce the risk of fungal attack. On the other hand, for a house with a concrete floor the ventilation would best be closed in terms of fungal deterioration. Considering the risk of other deteriorating agents, it is strongly recommended to construct innovative inspection/monitoring options for the concrete foundation without ventilation.

Table 1. Temperature, humidity, the MC of foundation timbers, the CFUs/cm^2 of the fungal samples from foundation timbers in the crawl space, and the CFUs/plate of the fungal samples from the atmosphere of the crawl space when the test sections were air-tightly closed to the outside.

	Soil section		Concrete section	
	Before closing	After closing	Before closing	After closing
Temperature (˚C)	13.3	8.9	13.6	8.9
RH (%)	83	98	67	62
Average MC of foundation timbers (%)	22	28	15	14
Fungi from the crawl space atmosphere (CFU/plate)	29.6	106.5	2.8	0

This study clearly indicated the importance of foundation system in wooden houses, and the higher decay risk in the soil floor than in the concrete floor.

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