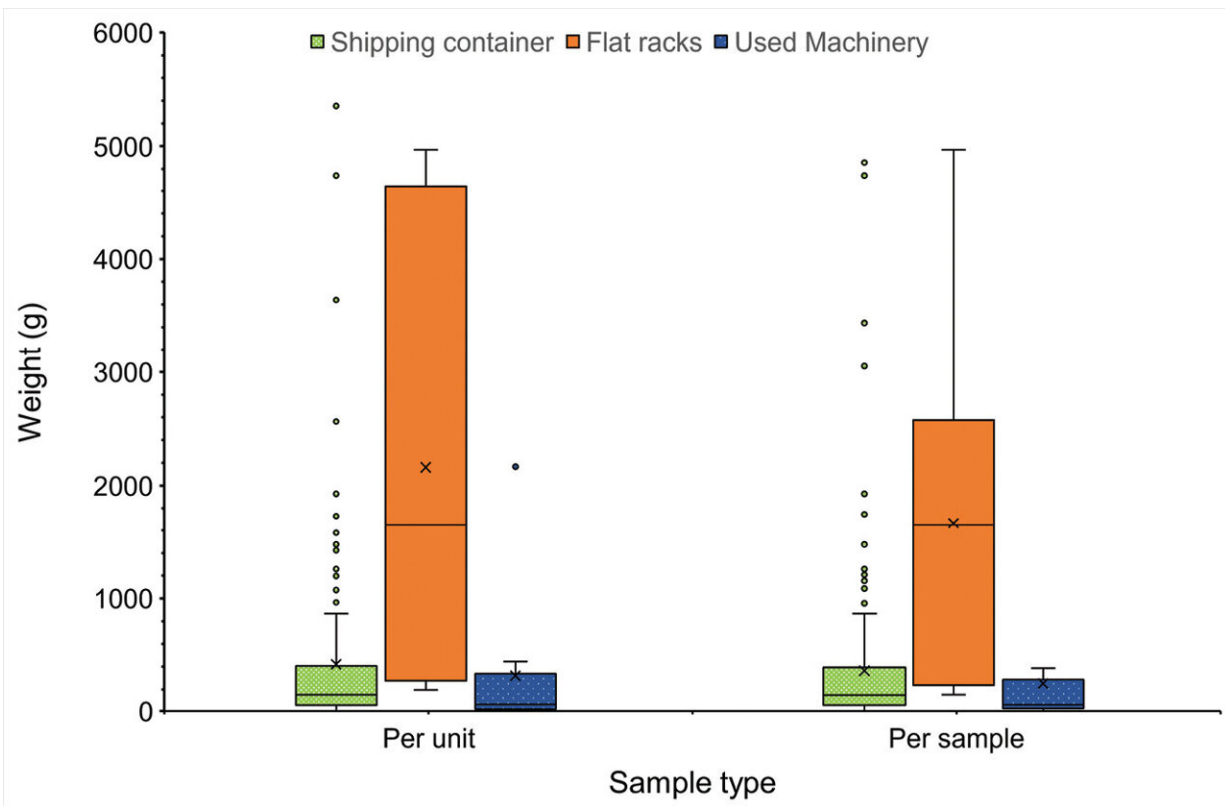


Soil carried on sea freight loaded with dangerous pests and diseases: Study

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Boxplot indicating the amount of soil (g) (minimum, first quartile, median, mean, third quartile, and maximum) collected from shipping containers, used machinery and flat rack containers at New Zealand seaports per unit (individual freight or machinery item) and per sample, respectively. Credit: *NeoBiota* (2023). DOI: 10.3897/neobiota.88.98440

Often introduced unintentionally by human activities, invasive alien species can outcompete and overwhelm native flora and fauna, driving species to the brink of extinction and disrupting the balance of ecosystems. Understanding why exactly they establish in new locations and how they got there in the first place is crucial if we are to mitigate their destructive effects. Unfortunately, there isn't enough research on this, and the answers might not always be straightforward.

A research team from AgResearch and Better Border Biosecurity (B3) investigated the biological risk posed by [soil](#) on the external surfaces of sea freight such as shipping containers or used machinery at sea ports in New Zealand. With their work, the researchers hope to facilitate the assessment of relative biosecurity risks between different introduction pathways and contribute to the development of more efficient measures against them.

The team found soil on most types of sea freight, irrespective of origin, with all soil likely to vector microbes, including [plant pathogens](#). The amount of soil recovered from a single sea container was 5.3 kg, while the overall mean weight collected from sea freight was 417g, with most of the soil found on the underside of sea freight.

"While the presence of soil is perhaps not surprising, the presence of live bacteria, fungi, worms, seeds and insects associated with the soil was of greater concern. Various regulated biosecurity organisms were recovered from the samples, including plant-parasitic worms, seeds, insects and spiders that were not recorded as being present in New Zealand," says Mark McNeill of AgResearch, who led the study.

"Not only does the spread of exotic species through these networks represent significant environmental, economic and [social costs](#) to natural and agricultural environments if [invasive alien species](#) were to establish, a [loss of biodiversity](#) is also an expected consequence of invasive alien

species establishment."

"For islands, the implications can be significant, as they have high levels of endemism and invasive alien species establishment can lead to extinction of species as well as biodiversity declines," the researchers write in their [paper](#), which was published in *NeoBiota*.

Compared to a [previous study](#) on contaminated footwear carried in luggage by international airline passengers, the number and diversity in soil on sea freight was smaller than soil transported in more protected environments (e.g., footwear in luggage).

This showed that biosecurity risk can vary with pathway. However, prioritizing one soil pathway over another according to the risks they present, and differentially allocating resources is problematic, because the relative risk is dynamic, dictated by factors such as new pests or diseases entering the respective pathways.

Even so, the researchers suggest that contaminated sea freight is an important introduction pathway for [exotic species](#). The establishment of such species can be prevented by cleaning containers prior to departure, inspection at the border, and further cleaning where required.

More information: Mark R. McNeill et al, Defining the biosecurity risk posed by soil found on sea freight, *NeoBiota* (2023). [DOI: 10.3897/neobiota.88.98440](#)

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