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Vehicle transport of seed and soil under varying conditions and distances.

Secondary movement of plant propagules by vehicles is an important but relatively unmeasured component of the invasion story. There are few data quantifying the number of propagules accumulating on vehicles under different driving conditions, or information on how far propagules are dispersed once present on a vehicle. As a result of our SI-1545 project we now have data on both of these important aspects of plant dispersal.

We have completed plant propagule accretion experiments on military and civilian vehicles participating in field exercises and driving on a combination of surfaces (paved, unpaved and off-road) under both wet and dry conditions. More propagules were accreted on vehicles driven off-road than on unpaved surfaces, and least were observed from vehicles driven on paved surfaces. On unpaved surfaces, tracked vehicles accreted over four times more plant propagules than light or heavy wheeled vehicles, and this increased to an 11 fold difference under wet conditions. For the same vehicle type there were differences in propagule accretion between road conditions: tracked vehicles gained 26 times and HUMVEES 11 times more plant propagules under wet than dry conditions. This demonstrates that propagule accretion onto vehicles differs by vehicle type, road surface and driving conditions.

To understand the residence distance that individual seeds remain on a vehicle driven under different conditions we designed a more controlled experiment. Known amounts of a soil and seed slurry were placed onto specially fabricated 0.1 m^2 plates, dried, and then attached to the chassis of a civilian pickup truck. The vehicle was driven six set distances (from 0 - 130 km) on either unpaved or paved roads and under both wet and dry conditions. Data were fitted to a dispersal curve (Kot *et al.* 1996, Model 4: $N = e^{(a-b\sqrt{x})}$). Preliminary analysis suggests that the rate of seed loss from the vehicle when driven on dry pavement was similar to the rate of loss when driven on unpaved roads under wet or dry conditions. But, on wet paved roads the rate of seed loss was much higher, with 25 % of seed lost by 30 km and 50 % by 130 km compared to dry conditions where only 4% of seed were lost within 30 km and 10 % by 130 km, demonstrating a fat dispersal tail and long dispersal distance. Further experimentation and analysis will allow prediction refinements for secondary dispersal curves and distances by vehicles.