news from the center for invasive plant management

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Seed Dispersal by Vehicles

By Dr. Lisa Rew and Fredric Pollnac[1]

If you have ever driven your vehicle off-road or on an unpaved road surface, chances are that you have played an active role in the seed dispersal of one or more plant species in the area through which you were driving. This may not seem like much of a problem unless one of those species happens to be invasive. Even if your vehicle only moved a few seeds of this invasive species a short distance, natural events such as wind gusts, surface runoff, or the movement of wild animals could have dispersed the seed just as far. In this case, your vehicle did not augment the dispersal of the species in comparison to natural events. On the other hand, what if numerous seeds became attached to your vehicle and stayed there for several hundred miles before falling off in an area where that invasive species is not yet present? If the conditions were favorable, you might have unknowingly created a new invasion front.

Although the potential for this type of event to occur has been recognized for a long time, only a few scientific studies have documented the presence of seeds on motor vehicles, thereby confirming that seeds can, in fact, become attached to vehicles. Such general information, while often informative for land managers, does not provide the detailed information that is needed to justify management decisions or shifts in current management policies. In the hypothetical case mentioned above, what are the odds that a seed would be transported over such a long distance, and how many seeds might become attached to the vehicle through the course of its travels? A plant ecology research team at Montana State University, lead by Dr. Lisa Rew, has begun to try to answer some of these questions in an effort to provide managers with the information they need to make informed decisions about an issue which has, until now, lacked the support of quantitative data.

In 2007, a series of experiments were conducted to evaluate the effectiveness of vehicle washing units in terms of cleaning debris off of vehicles and provide a set of methods for examining the number of seeds transported on various types of vehicles. Commercial vehicle washing units typically clean mud and debris from vehicles using undercarriage washers and high-pressure hand sprayers. The wash water is then subjected to an extended filtration and settling process, aimed at removing waste (sediment and other large particles) from the water so that it can be reused for future washes. Dr. Rew's team was interested in seeing if seed material could be isolated through this process so that the waste from the wash of a particular vehicle could be used to estimate the number of seeds that vehicle had transported. They discovered that, though

the washing and filtration process kills some of the seeds, many are left unharmed. Therefore, waste samples can be transferred to a greenhouse where seedlings can be counted and identified as they emerge from the sediment. Applying a correction factor for the amount of seed destroyed in the washing process provided an effective estimate of the number of non-dormant seeds attached to the vehicle that was washed.

From 2007 to 2009, several additional experiments were performed to investigate seed transport on different types of vehicles and on various road surfaces. One set of experiments focused on military vehicles (ranging from Humvees to A-1 Abrams tanks) during training exercises in Idaho and Montana. This study found that vehicles pick up a large amount of seed even when driven on dry and unpaved roads in June, with more seeds transported on tracked vehicles than wheeled ones. As one may imagine, more seeds were found on vehicles driven off road than on unpaved roads. Interestingly, those seeds fell off as the vehicle drove along a paved road. These experiments showed that a four wheel drive SUV/truck would pick up, on average, 176 seeds per 50 mile trip on dry unpaved road in June. Comparative information for wet summer conditions is forthcoming.

Another set of studies focused on consumer four wheel ATVs. ATVs were driven set distances in off-trail and on-trail settings. Dr. Rew's team found that, within their study area, ATVs picked up approximately 15 times more seeds off-trail than on-trail in the fall, and approximately 80 times more seeds off-trail than on-trail in early summer. During this study, they saw that ATVs were capable of picking up as many as 200,000 seeds over 48 miles of travel (about 4200 seeds per mile), out of which roughly 750 were from noxious weeds.

To gain a more complete picture of this issue, other questions must be answered. For example, if a seed becomes attached to a vehicle, how far is it likely to be transported before becoming detached from the vehicle? Dr. Rew's team is currently performing experiments that aim to answer that question. For now, the information on the number of seeds collected on vehicles over certain distances suggests that the theories about vehicles being vectors for the transport of plant species have merit.

Aside from actions taken by management agencies, the problems arising from this issue can also be minimized by the application of common sense on the part of the individual. Avoid driving off-road through areas infested with invasive plant species whenever possible. If you have been traveling off-road or on unpaved road surfaces where invasive plant species are present at the roadside, make your best effort to clean off your vehicle as soon as you can before or after leaving the area. If you happen to see a voluntary vehicle wash station, pull over and take advantage of it. With a trained crew, washing a vehicle takes about three to six minutes, and is a small price to pay to help prevent the spread of undesirable plant species.

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