Photo 1: Got your attention?!? Humans are notorious for spreading germs, and hence, diseases. Through human health research, these diseases, and yes fecal matter, are associated with door knobs, shopping carts and even the traditional greeting known as the handshake.

Photo 2: Everyone in Michigan should know that the EAB can be spread in firewood. While this bumper sticker may have initially been useful, the widespread dissemination of the EAB now makes it largely impractical. Similar bumper stickers may now be more useful and educational for inhibiting the spread of oak wilt or other maladies. We all need to be "Ambassadors" of promoting human and plant health.

Photo 3: Virtually everyone in the landscape and nursery industries understand that pruning utensils can spread Fire Blight, in this case on Mountain Ash. Bacteria that cause Fire Blight are so small that billions of bacterial cells could contaminate our pruning utensils and we could still not see them.

The Plant Doctor's LANDSCAPE TIPS

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SANITARY MEASURES FOR THE PLANT INDUSTRY

INTRODUCTION:

For most of human history, diseases, whether they occurred on plants or within the human population, were often attributed to supernatural occurrences. Part of the challenge was that many of the disease factors were microscopic, and couldn't be seen by the unaided eye. Even so, in Biblical times, the hordes of clearly visible locusts that consumed all the crops were attributed to God's wrath on humans because of their sins. The theory of "Spontaneous Generation"—that maladies simply appeared out of thin air—was passed down from generation to generation as an accepted law of nature (or God) for 1,000s of years. And, along with the "Constancy of the Species" (plants and animals never change) these theories were consistent with religious teachings and societal beliefs of the day. Clearly, ignorance begets mysticism. Free thought and inquiry were often met with jailing or even death, inhibiting facts and truth for many millennia. As the human population in Europe increased, human catastrophes also increased. During the Middle Ages, ergotism, also known as "Holy Fires," resulted when humans ate milled rye and wheat that had been infected by the ergot fungus. The poisoning was so terrible that people convulsed, hallucinated, became delirious and with continued consumption, eventually died (ergot poisoning also resulted in gangrenous necrosis of the fingers, toes and ears). Another major catastrophe was the Irish Potato Famine during which one million people (of an eight million population) died of starvation and more than one and a half million people emigrated from Ireland.

Catastrophes eventually stimulated rethinking of mystical theories by a few rational if radical individuals. In 1807, Prevost, a Swiss Professor, observed the germination of fungal spores and proposed the "Germ Theory," a revolutionary idea that was vehemently rejected for several decades by various scientific and religious organizations of the day. Eventually, Anton de Bary supported the Germ Theory by demonstrating that a fungus (Phytophthora) undoubtedly caused the infection and destruction of the potato crop that had led to the Potato Famine in the mid 1800s. Information obtained through rational thinking and scientific inquiry is often slow to be adopted by humans, as is unfortunately still the case to this day.

Bathroom Manners: Today, even though we humans possess a great deal of scientific knowledge and understanding of the natural world, we're still fairly ignorant about germs. If my recollection of some statistics is correct, something on the order of 60% men and 40% women do not wash their hands after using the facilities (Photo 1). Complicating these stats, why are there signs in many restaurant facilities proclaiming that "employees must wash their hands" after using the bathroom when they cannot exit the lavatory without touching the door knob, contaminated by people who didn't wash their hands? And of the people who do wash their hands (personal observational research), many individuals touch the faucet handles to turn on the water, wash their hands and subsequently touch the previously contaminated faucet handles (and the air dryer knob or paper towel dispenser, and door knob), thus nullifying their well-intentioned efforts.

PLANT DISEASE AND PEST DISSEMINATION:

While the "yuck factor" described above might cause some individuals to wince, those who care about not contracting germs will certainly modify their behavior after realizing these pragmatic disclosures. Adopting sanitary measures for the plant industry is really quite simple if our current knowledge is combined with some very practical manners. In order to implement some sanitary measures for the plant industry, it is important to understand how germs (disease agents) and pests are spread. Following is a brief summary of some of those methods:

Plants: Obviously, one of the major modes of disease and pest dissemination is via transportation of plants and plant products. The shipping of plants/materials within or between

states or countries can bring in new agents that have never been encountered on-site previously. As we know for example, the transfer of wood can carry numerous pests such as the Emerald Ash Borer (Photo 2). But many other pests and diseases can also be disseminated in live plants or portions of plants. Vascular wilts of plants such as Oak Wilt, Dutch Elm Disease (DED) and Verticillium wilt can readily be transported in plants and/or portions of plants (ex. wood). So can many leaf problems, root rots, cankers diseases, as well as many pests.

Soil: Soil and other media is a great carrier of diseases and pests. Many plants are imported into Michigan from other states far away, such as Georgia or California or Oregon. Whatever diseases (or pests) are prevalent in these other states can be potentially if easily shipped here. Sudden Oak Death (Phytophthora) is an example.

Tools and Implements: Diseases in particular, because most are microscopic (Photo 3), are easily spread on tools. These tools (Photo 4) include pruners, loppers, chainsaws, drills and injection equipment, shovels, to name a few. Tools that injure plants (pruners, chainsaws) can transmit disease agents and cause infection more effectively because the injury created by the tool provides an avenue of entry into plants. Theoretically for example, oak wilt, DED, Verticillium wilts and so forth can be transmitted in this manner. Mowers are an ideal way to spread diseases (Photo 5) because mowing often takes place when there is moisture present (dew, etc., aiding survival spread and infection) and because of wounding. Tires of mowers and other vehicles can also carry diseases. Some agents such as viruses and bacteria can even be carried on our hands.

SANITARY MEASURES:

A significant challenge to thwarting the spread of diseases and pests is that many are invisible (hidden and/or microscopic). However, just because they are invisible (think bathroom here) doesn't suggest we should not wash our hands and adopt proper sanitary measure to ensure minimal spread of these unwelcome critters. Following are a few tips that may help us accomplish our goals whether they help prohibit human or plant maladies.

Rid Tools of Plant Debris: My mother often invoked the saying "Cleanliness is next to Godliness" when she wanted her sons to take their baths. One of the first practical sanitary measures is to eliminate plant debris and soil from tools: ex. mowers of grass clippings, chain saws of chips and saw dust, shovels of "dirt." This first cleaning will make our overall strategy of sanitizing tools more effective since many sanitizing agents may not be able to completely penetrate and sterilize saw dust, grass clippings, and soil particles.

Sanitizing Agents: There are a plethora of sanitizing agents available to sanitize our tools. These include alcohol, sodium hypochlorite (Photo 6, household bleach), quaternary ammonium salts and many other fine products marketed under a variety of trade names.

Be Observant: If a particular tree appears sick it might not be advisable to take it to your client's landscape just because it's on sale. And, if a tree appears in ill health, it would be prudent to sanitize the pruners before pruning another tree.

Common Sense: Just as Thomas Paine would advocate not touching the bathroom door knob to exit after washing your hands, it is also important to be pragmatic about nursery and landscape issues. It may be useless to sanitize utensils between each cut when pruning a particular tree that exhibits signs of a vascular wilt, but it would be very important to sanitize that tool before beginning the pruning of another tree.

In summary, if we think of those bathroom conditions, we can readily adapt similar sanitary measures to our everyday landscape arboriculture work.

For more information, please feel free to email David Roberts at robertsd@msu.edu or contact a professional plant health care provider. The author, MSU and MGIA do not endorse any particular products. If using pesticides, be sure to read and follow label directions.

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Photo 4: Many tools and utensils we use in the plant industry can transmit diseases. The tool may harbor the disease agent directly or indirectly in plant debris (ex. saw dust or wood chips). Hence, many diseases other than Fire Blight may also be spread by utensils.

Photo 5: Mowing equipment can readily spread diseases and even, perhaps, pests. In this particular situation, glyphosate (=Roundup herbicide) was spread by a mower onto turf after the border of a nearby landscape bed had been treated with the herbicide.

Photo 6: There are many sanitizing agents on the market. One of the most effective and least costly is household bleach. Be careful however, bleach can be dangerous and can make dark clothes whiter than white!