

Invasive...or Vulnerary?

By Jean Giblette

Invasive, exotic plants are a favorite target of outrage within our public institutions and private gardening clubs. Some of the rhetoric is rather colorful:

Day by day, acre by acre, aliens are quietly spreading throughout America. They arrive by air, in ships, and over highways. They don't carry identification, and they don't stop at borders. Despite dozens of vigilant government agencies, including the Department of Defense, on the lookout — they slip in.¹

This warning may be reinforced every time a suburban householder faces a lawn full of dandelions, or a motorist drives along a highway lined with purple loosestrife. The typical response is an attempt at eradication, using herbicides or mechanical means to wipe out the invaders.

The war on *terroir*

No need to hold xenophobic attitudes up for ridicule, as the job was accomplished very thoroughly in 2003 by David Theodoropoulos, a remarkable plantsman and proprietor of J.L. Hudson Seedsman, a public access seed bank in California.² With his literate critique adding fuel to the fire, the debate over invasive plants became as politicized as other wars on terrorism in the post-9/11 world.

More recently, however, moderate voices have risen. The permaculture movement has produced at least two fine examples in the United States of constructive arguments concerning non-native, dispersive or expansive plants. Toby Hemenway, author of *Gaia's Garden*, points out that we're trying to restore ecosystems we don't yet understand. "Much of our efforts in eliminating exotics is a complete waste of resources at best, and at worst is a terrible use of poisons to destroy a hybrid habitat whose function we don't yet grasp."³

Dave Jacke and Eric Toensmeier, in *Edible Forest Gardens*, suggest that protection of ecosystems may involve a careful, empirical approach that takes our ignorance into account. They recommend "planting natives in associations as close as possible to those in which they were last known to have grown naturally, as well as trying them in new combinations of both natives and exotics."⁴

To hear another voice of reason, consider this argument from the point of view of an ecological gardener who has weed-whacked plenty of garlic mustard: the problem may be one of human misperception leading to choices that make things worse.

The problem of object and ground

As a result of Western cultural heritage we tend to focus on the object in front of us rather than the context. Cultural differences in perception are documented.⁵ Westerners tend to see threats coming at us without considering how we have placed ourselves in the path of,

or provoked, the behavior. Depending on your politics you may hear this as victim psychology or liberal guilt, or you may recognize how human psychodynamics tends to project aggression outward onto others. Yet, careful consideration of the ground as well as the object is required for clear perception.

Culturally-learned perception covers or misses the context in both space and time. Time is the fourth dimension, the one least likely to be accounted for with the methods of modern Western science. Usually the funding doesn't last long enough to measure longitudinal or cumulative effects.

Imagine looking into a woodland in spring, a big swath of garlic mustard (*Alliaria petiolata*) at its edge. Would you say the garlic mustard is "poised" to "invade?" Now think of the entire context, starting with the historical. That woodland has almost certainly been logged off, at least once. Clear-cut logging (used by the European colonists to clear fields for agriculture) causes a drastic crash in ecosystem biodiversity. We have no way of knowing how many species were lost in the first cut, centuries ago. When the trees return, as now in the Northeast, many of the understory plants do not. Understory shrubs, herbaceous species including rare flowers and valuable medicinal plants, are absent in most locations. The people who remember what used to grow there are long gone.

In the remnants of the Eastern forests, the overpopulation of deer assures that many native understory plants are browsed off early in the season. Solomon's seal is almost gone from the wild because it's such a delectable deer tidbit. Deer hunting has become unfashionable, but we kill other top predators like cougars and coyotes that may eat deer. So let's just be clear: humans are blaming garlic mustard for all this imbalance?

To me, a swath of garlic mustard is a message from Mother Nature: "Hey, you! Naked ape! Plant something here!" That's what I do, bit by bit, and when a healthy stand of understory plants is growing the garlic mustard goes somewhere else.

Learning to recognize voids

When we look at a typical woodland, we see and say "ahh, lovely nature" when what is actually in front of our eyes are trees of different ages...and voids. Every experienced organic gardener knows that Mother Nature abhors voids. That's why we use cover crops and mulches, to substitute for plants growing on the surface which "cap" the underground microbiome and help maintain a moist, aerated, healthy environment below.

Any use of herbicides will diminish biodiversity and ecosystem health even further. (Monsanto pretended for years that its Roundup biodegraded into harmless chemicals until fined in 2007 for false advertising in France, later confirmed by that nation's highest court.⁶) Note that many conferences on invasive plant management involve training in the use of toxic chemicals. Invasiveness as a concept provides a convenient niche market for the agrochemical industry.

Attempts at remediation that employ squads of volunteers to go in and pull out all the garlic mustard (then stuff it into black plastic bags that go into landfill) are perpetuating the voids if no functional substitute is planted there. The supposition that oppressed native plants will breathe a sigh of relief and spread themselves out, now the invader is vanquished, is wishful thinking. Do natives that fill the garlic mustard's function exist in that area, or must they be imported? Are they so slow-growing they need to be propagated in volume at a nearby nursery and replanted?

Only when we begin to realize what is not in that woodland—to identify those missing elements integral to the balance of the ecosystem--can we address the problem in an adaptive way. While physical removal of the obnoxious plant may be prudent in certain cases, immediate replanting of a species that fills the same ecosystem function is necessary to mitigate an increased level of imbalance.

Wetlands, dry lands, prairie, plain, river or ocean – all living ecosystems of the world have suffered human disturbance to a lesser or greater extent and are candidates for remediation. Best case scenario: you and I may spend the rest of our lives planting to fill voids in our locales. It's called “moving from an extractive economy to a restorative economy.” How we pay for all this effort is still an open question. However, we will pay with more and faster loss of habitat and species extinction if we do nothing.

Some voids are more invisible than others

Of all forms of biodiversity, the most under-appreciated have been the soil microbes. Plants of all kinds do not take up nutrients directly from minerals in the soil. They feed on the metabolic byproducts of microscopic soil creatures. Until very recently, the number, diversity and complex relationships of microbe species were almost unknown. Now there is an emerging awareness of how plants may maintain unique communities of symbiotic microbes.⁷

The vegetable realm is hardly as passive as our mammalian biases allow. Plants are now known to release substances from their roots to attract and cultivate symbiotic microbes. A micro-cosmos of being, begetting, dying and decomposing – biodiversity beyond common imagination -- underlies the health of the plant and of the ecosystem.

The damage to these relationships from herbicides, artificial fertilizers and other chemicals can scarcely be calculated at present. The environmentally-conscious public has heard of the impact of agricultural chemicals such as Atrazine on frog mutations, but less known is the fact that ordinary nitrate and nitrite fertilizers also damage the life-cycles of amphibians.⁸ If these chemicals cause so much disruption to the existence of larger organisms, what is the impact on the delicate balance of invisible, unknown microbial relationships in the water and the soil? Artificial fertilizer runoff pervades our waterways. How much easier for a government agency to point the finger at a plant occupying the damaged space rather than to confront the actual source of the problem – the industrial agriculture complex!

Speaking of microbes, have you heard that the germ theory is dead? Thanks to the relentless propaganda of soap advertisements, most Americans have not. The number of species of microorganisms discovered very recently dwarfs the number of organisms large enough to be seen with the naked eye. The “tree of life” schemes showing taxonomic orders have been revised accordingly. In 1987, 13 taxonomic phyla of life were known; by 2004 there were 80.⁹

Plants have their own special microbe friends and we do, too. One person’s estimated 10 trillion human cells are outnumbered by ten times that many microbes living on or inside the body, complete with a distinctive set of gut microflora. The number of microbes in an ounce of soil is greater than the population of all *Homo sapiens* living on the planet.

Most Americans take pharmaceutical drugs; according to the director of the National Institute on Drug Abuse, twenty percent of the U.S. population age twelve and over have used prescription pharmaceuticals for “nonmedical reasons.”¹⁰ Many of these chemicals pass through the body and persist in the water¹¹, and junk foods such as artificial sweeteners do the same¹², let’s add Big Pharma and Big Food to the list of perpetrators of pollution.

With dinosaurs like industrial agriculture, industrial food and industrial medicine stomping unimpeded around the planet, we’re blaming *plants* for our problems? Let’s look at an alternate scenario for what may be happening when an expansive or persistent plant muscles its way into your territory.

Nature’s first-aid kit

A database of offenders is maintained by the University of Georgia and the National Park Service at <http://www.invasiveplantatlas.org/>. More than 1100 species are listed, along with the counties reporting their presence in natural areas. Not all species are exotic, as a plant outside its native range may be perceived as a problem.

While this database is an excellent resource on the subject, the content holds some surprises. Common weeds like burdock, dandelion and plantain are there (all those are medicinal herbs), but so are beloved shrubs and trees like horsechestnut, lilac, and willow. A large number of these species are useful. The infamous kudzu, for example, was planted in the 1930s for erosion control in the southern states. Looking at this example in full context, we remember that the soils of the South had been stripped of fertility through continuous planting of tobacco and cotton.¹³ An ecosystem crash had occurred previous to the kudzu “invasion” and is perpetuated every time herbicides are sprayed.

Kudzu root and flower are also valuable Chinese medicinal herbs. This example, along with that of the Japanese knotweed now lining the creeks in my locale, prompted a look-up of the herbs listed in both the Alien Plants database and Bensky¹⁴, the English translation of the Chinese materia medica. This selection is hardly exhaustive, especially

considering that the 500 or so species in Bensky are a small fraction of the over 7,500 plant species of the current official version of the Chinese materia medica.

The current online Invasive Plant Atlas consists of 1,212 records. The listings include the total number of U.S. counties where the plants have been found. Keep in mind that the list includes both natives and exotics, and some beloved and/or useful plants such as lilacs, lilies of the valley, hollyhocks, nettles, red clover and white clover.

The online invasives list was compared to the species covered by the Bensky materia medica, the primary text used in U.S. graduate schools of Chinese medicine. Only those standard herbs, alternates or local variants listed in Bensky AND in the online invasives list were counted.

Seventy-three of the 1,212 invasive species (5.8%) were found in Bensky. A study of descriptions of the Chinese medicinal herbs for which the 73 species are standard, alternates or local variants suggested that their functions are not merely a random selection of all possibilities. Of this group, 46 (63%) have a cool or cold nature, which indicates a tendency to slow metabolic processes or reduce inflammation, among other similar functions.

Thirty of the 73, or 41%, have an affinity with the Lung channel which is one of 10 possibilities in the Zang Fu organ system. The Lung channel governs the skin, which is also an organ of respiration.

The surface of our planet is its skin, consisting of air, soil, microbes, plants and water. To cope with a breach or disruption in the skin, including microbial imbalances caused by biodiversity reduction, planetary systems have their own means of repair. All experienced farmers and gardeners know that nature abhors bare soil and will fill in with “weeds.” The more moisture in the ecosystem, the more quickly this process occurs. Think of the analogy to how we handle wounds in our human skin: we stop the bleeding to assist coagulation of blood, clean the affected area, apply a bandage to keep the skin moist, prevent infection, assist the formation of a scab and scar tissue. We take these precautions, but in a healthy person wounds heal “by themselves,” i.e. when the friendly microbes restore the balance and the tissues grow back.

In an ecosystem, a strong aggressive plant may function as a bandage to keep the soil moist and aerated with root penetration. The plant may manage the microbial substrate in unknown ways to promote biodiversity and restore balance. The timeframe for healing may be much longer than we’re prepared to wait, but this is plant time. How long does it take a blown-off mountaintop to heal? Perhaps another glacial age.

“As above, so below.” Wouldn’t this Hermetic principle suggest that Gaia has her own agents to perform the vulnerary function? Try to see the world through Her eyes, and gain new respect for medicinal plants. We are more dependent on them than we suppose.

Examples of Chinese Medicinal Plants in the Invasive Plant Atlas

Common Name	Botanical Name	Pinyin of Medicinal Part	Medicinal Part(s)	Bensky Page	Nature	Channels Entered
Tree-of-heaven	<i>Ailanthus altissima</i> (Mill.) Swingle	chūn pí	bark, rootbark	872	cold	Large Intestine, Stomach
Japanese knotweed	<i>Fallopia japonica</i> Sieb. et Zucc. [listed as <i>Polygonum cuspidatum</i> in Bensky]	hǔ zhàng	rhizome	572	cold	Liver, Gallbladder, Lung
Ground ivy	<i>Glechoma hederacea</i> L. [Bensky lists the close analog <i>Glechoma longituba</i> (Nakai) Kupr.]	lián qián cǎo	herb	306	slightly cold	Kidney, Bladder
Cogongrass	<i>Imperata cylindrica</i> (L.) Beauv.	bái máo gēn	rhizome	579	cold	Lung, Stomach, Small Intestine, Bladder
Woad	<i>Isatis tinctoria</i> L. [Considered synonymous with <i>Isatis indigotica</i>]	běi bǎn lán gēn	root	158	cold	Heart, Lung, Stomach
Japanese honeysuckle	<i>Lonicera japonica</i> Thunb.	jīn yín huā	flowerbud, vine	148/151	cold	Large Intestine, Lung, Stomach
Common reed	<i>Phragmites australis</i> (Cav.) Trin. ex Steud. [synonym = <i>Phragmites communis</i> Trin. in Bensky]	lú gēn	rhizome	106	cold	Lung, Stomach
Kudzu	<i>Pueraria montana</i> var. <i>lobata</i> (Willd.) Maesen & S.M. Almeida	gé gēn/huā	root, flower	70	cool	Spleen, Stomach
Fivestamen tamarisk	<i>Tamarix chinensis</i> Lour.	xī hé liǔ	stems, leaves	45	warm	Lung, Stomach, Heart
Coltsfoot	<i>Tussilago farfara</i> L.	kuǎn dōng huā	flower	442	warm	Lung

¹ Silent Invasion: A Call to Action, October 2002. National Wildlife Refuge Association.
[http://www.refugenet.org/new-pdf-files/Silent Invasion pdf.pdf](http://www.refugenet.org/new-pdf-files/Silent%20Invasion%20pdf.pdf)

² Theodoropoulos, D., 2003. Invasion Biology: Critique of a Pseudoscience (Blythe CA: Avvar Books Paperback, 256pp). Buy here: <http://www.jludsonseeds.net/Books.htm>

³ Hemenway T, 2007. "Native Plants: Restoring to an Idea"
http://patternliteracy.com/articles/native_plants_restoring_to_an

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- ⁴ Jacke D and Toensmeier E, 2005. *Edible Forest Gardens*, Vol. 1 (White River Junction VT: Chelsea Green), p. 159.
- ⁵ Chua HF, JE Boland and RE Nisbett, 2005. Cultural variation in eye movements during scene perception, *Proc Natl Acad Sci USA* 2005 August 30; 102(35): 12629-12633. Downloaded 4/30/09 at: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1194960>.
- ⁶ “Monsanto Guilty in False Ad Row,” BBC News, 15 October 2009, <http://news.bbc.co.uk/2/hi/europe/8308903.stm>
- ⁷ Sylvain ZA and DH Wall, 2011. Linking soil biodiversity and vegetation: Implications for a changing planet. *American Journal of Botany* 98(3): 517-527. <http://www.amjbot.org/content/98/3/517.full>
- ⁸ Marco A, C Quilchano and AR Blaustein, 1999. Sensitivity to nitrate and nitrite in pond-breeding amphibians from the Pacific Northwest USA, *Environmental Toxicology and Chemistry* Vol 18 Issue 12, pp 2836-2839.
- ⁹ Shaw, Jonathan 2007. *The Undiscovered Planet*. In: *Harvard Magazine* Nov-Dec'07, pp. 44-53. <http://harvardmagazine.com/2007/11/the-undiscovered-planet.html>
- ¹⁰ U.S. NIH National Institute on Drug Abuse, “Prescription Drugs: Abuse and Addiction,” <http://www.drugabuse.gov/publications/research-reports/prescription-drugs/director>
- ¹¹ Emerging Contaminants Targeted in a Reconnaissance of Ground Water and Untreated Drinking-Water Sources, http://toxics.usgs.gov/highlights/gwsw_ec.html
- ¹² Artificial sweeteners may contaminate water downstream of sewage treatment plants and even drinking water. *Science Daily*, 6/18/09 <http://www.sciencedaily.com/releases/2009/06/090617123650.htm>
- ¹³ Busscher, W.J., Schomberg, H.H., Raper, R.L. 2010. Soil and water conservation in the southeastern United States: A look at conservation practices past, present, and future. In: Zobeck, T.M., Schillinger, W.F., editors. *Soil and Water Conservation Advances in the United States*. Madison, WI: Soil Science Society of America Special Publication 60. p. 183-200. <http://www.ars.usda.gov/SP2UserFiles/Place/66570000/Manuscripts/2010/Man828.pdf>
- ¹⁴ Bensky D, Clavey S, and Stöger E, 2004. *Chinese Herbal Medicine Materia Medica*, 3rd Edition (Seattle WA: Eastland Press Inc.)