Purity of Herbs and Standardization

Ingrid Naiman

In the late 1960's, I worked for the U.S. Department of State in India. After spending months on a research project that took me to hundreds of villages, I was invited to lecture on the Green Revolution, the idea being that triple cropping would enable everyone to become fully nourished. I declined the invitation because what I had seen offered no such promise.

Before commenting on the changes that have occurred in the years since I lived in India, I want to relate an incident that took place in Hyderabad when four American businessmen were putting pressure on farmers to use the seeds these men were urging upon the Indians. A courageous man of very slight build said to the salesmen who had been bullying him that he is here today because he grows what his father grew and his father grew what his grandfather grew and so it has been for thousands of years.

I come from a family of scientists. My favorite uncle was an oceanographer who wrote ponderous textbooks that are still in use. At the end of his life, he wrote a little collection of his favorite thoughts, one of which etched itself on my psyche, "If you wish to understand Nature, do not disturb Her."

We would all be wise to remember what the farmer in the dhoti said and to heed the advice my uncle left to posterity. Western civilization has been on a rampage and sees Nature as something to be exploited, conquered, and transformed. This utilitarian view would perhaps be acceptable if there were no repercussions from dumping herbicides and pesticides on plants – dare we mention oil drilling, fracking, and nuclear waste disposal – but as we well know, the plants absorb the toxins so the price we pay for our folly is toxic food and herbs, not to mention soil, water, and air. It is against this backdrop that I question the direction we are heading.

The View

As spring has blessed us with an abundance of sun, I looked out the window and noticed the Scotch broom growing in the greenbelt behind my fence. A new book had just arrived, *Invasive Plant Medicine* by Timothy Lee Scott. Instinctively, I reached for it, only to discover that Scotch broom was indeed one of the 25 herbs discussed in this masterfully written book.

For starters, it grows where Nature has been disturbed, such as where the bulldozers have cut paths for roads and easements. Secondly, this member of the pea family is, not surprisingly, a nitrogen fixer that restores the soil so that other plants can grow.

Photograph of Scotch Broom by Ingrid Naiman, 2013

Forgivingly, Scotch broom is an antioxidant that can be used medicinally to regulate the heartbeat, and its hepatoprotective properties are equal to or better than milk thistle. The point is not to rapture on and on about plants and how miraculous they are but to understand that regardless of the folly of mankind, Nature loves balance so when we disturb Her, she will Herself try to restore integrity by doing whatever is necessary to bring Her world back into harmony.

This is important because what we are now seeing in genetically modified fields is "an invasion" of glyphosate-resistant weeds. Some 21 herbicide-resistant weeds have been reported, the most noteworthy being pigweed, *Amaranthus palmeri*. This weed invasion has affected at least 120 million hectares globally, cotton and soybean fields being the hardest hit. Some weeds grow very fast and have deep roots. Pigweed, once cultivated as a dietary stable, quickly dwarfs its competitors and grabs the sun and water for itself. In fact, pigweed is doing more to challenge how we farm than all the Monsanto boycotts, marches, and petitions accomplished in the last decades, but it is just Nature doing what She must do to protect the Planet.

However, since I am writing this essay for AAPNA, the Association of Ayurvedic Professionals of North America, I would like to focus the bulk of my attention on India and its agricultural and herbal issues. In recent years, over 200,000 Indian farmers have committed suicide. Everyone in the world ought to be asking why and addressing the underlying causes of this holocaust.

In the context of this global agricultural crisis, I would like to address a few issues that are specific to herbal medicine, first contamination and quality control and then the controversy surrounding standardization of herbs.

Contamination of Herbs

When we are using weapons by-products on our plants, it ought not to surprise anyone that both food and herbs, not to mention forests are contaminated. The startling changes in what has always been very traditional began with various derivatives of mustard gas that had been developed for warfare and then "dumped" on crops as a way to control pests. No consideration was given to beneficial insects such as our pollinators.

Following WWII, nuclear contamination was added to industrial pollution and the chemicals used as herbicides and pesticides. In less than century, agriculture has been transformed in ways that demand review and assessmemt. If we add to this already shocking and untested change in how we grow our food and medicine the problems associated with poverty and the hygienic concerns that attend improper management of biological waste, there can be no doubt about the stage being set for a crisis.

Naturally, a backlash reaction should be anticipated when people realize that the chemicals they trusted to protect crops from pests and increase yields were actually toxic, carcinogenic, and damaging to DNA and fertility. The crisis of serious hormone disruptors and the onset of degenerative diseases in children was met by a groundswell of support for various alternatives to modern agriculture. First came the organic movement, then focus shifted to sustainability and then to permaculture and countless other innovative ways to grow plants in ways that protect future generations.

Bhutan was the first country in the world to announce its intention to go organic and be GMO free.[1] A tiny island in the South Pacific, Niue, hopes to be organic by 2020. Kerala also has a ten-year plan to become 100% organic by the same date as Niue.

Photograph by Jmhullot (Flickr)

Himalayan Sikkim might reach its goal by 2015. Though there are many calling for an organic plan similar to that of Kerala, it has not happened yet, and thus far, Maharashtra has only banned Bt cotton.

What we all need to keep in mind is that even if a country becomes pesticide- and herbicide-free, there will still be water contamination issues since much of water – well water, rivers, oceans – is laced with industrial waste and intentionally added chemicals such as fluoride, which studies recently determined could be addressed by tulsi.

What the researchers apparently did not report is what happens to the tulsi itself? For instance, if left in the water longer, would it be capable of eliminating even more fluoride or is there a limit? Should tulsi that has been used to remove fluoride from water be disposed of as industrial waste or has it transformed the water without injury to itself? These are important questions that could conceivably enhance our understanding of the mystery of this revered rasayana herb.

To clarify this matter for those who are not schooled in Ayurvedic medicine, there are herbs that have regenerative properties that are classified as longevity herbs. Some of these are also used in

alchemy to purify toxic substances, usually minerals and metals. Herbs such as neem, turmeric, and lemon are a few of the botanical materials used to purify toxic substances, but to-date, no one seems to have explained how the herbs are affected when used in alchemical processes. In can be argued that removing fluoride from water is an alchemical process, albeit vastly simplified compared to the procedures used for purifying arsenic and mercury.

The point here is simply that if tulsi is a true rasayana, which surely it is, it is possible that the herb remains therapeutic despite its exposure to toxins, but research does not seem to have been done in a way that establishes this as a fact one way or the other.

In the meantime, we are, of course, well advised to study herbs that can be used in remediation of our environment, and we ought probably to start with what volunteers itself in areas that are devastated. For instance, we need to look at what is growing in the evacuated areas around Chernobyl and what sprang up in Bhopal after the disaster in 1984.

It is very possible that if we observe Nature carefully, She will teach us how to heal ourselves and our Planet.

In the meantime, it is clear that if Indians had faith similar to that of the farmer in Hyderabad, it would carry on the tried and true practices of their ancestors and not imitate the West or poison its people with chemicals.

In any case, the issue of contamination of herbs is not separate from the issue of contamination in general. Food that is regarded as safe and that is supposed to be nutritious may have the same contaminants as other agricultural products, everything from Bt cotton to the most precious herbs used in healing.

Testing for Purity

When herbs are exported, they are tested for metallic, chemical, fungal, and biological contaminants. The herbs are tested by both the exporter and the importer using different laboratories. The results must match. If products used for domestic consumption were similarly tested, the environmental movement would probably get a big boost. By this, I mean that in the case of imported agricultural products, the liability is such that testing is mandatory; however, if everyone were as careful when it comes to food and herbs grown for the domestic market, there would probably be a powerful impact on the environment as well as health.

In any event, two points should be underscored before moving on to the second topic. First, the contaminants that are ubiquitous are a global problem requiring a solution, but the world being what it is, local efforts are often more effective than campaigns targeting larger spaces and more bureaucracy. Second, what must be realized is that just as the Scotch broom repairs soil that has been bladed by bulldozers, there are ever so many medicinal herbs that perform similar services for animal and human patients. Countless medicinal herbs, including some of those used to improve neurological functioning and memory, are weeds that grow in heavily contaminated areas. It would be folly to dismiss their medicinal properties without first testing to see if there is a limit beyond which a particular plant is incapable of transforming more toxicity.

Meanwhile, of course, research funds ought to be allocated to clinical trials of herbs that relieve the problems associated with environmental contamination.

Standardization of Herbs

The second issue to be addressed in this essay is standardization of herbs. Just as many agricultural practices that sustained countless species for thousands of years were suddenly abandoned in favor of untested and unproven chemicals, there has been a movement to treat herbal medicines as if they were pharmaceuticals rather than natural substances.

The pressure to standardize comes from allopathic emphasis on potency and is basically a projection of concerns that are more important with pharmaceuticals than herbs. Repeat: the theory supporting standardization is completely allopathic and is based on assumptions that are not generally regarded as important by professional herbalists.

In the attempt to determine why an herb works as it does, there is usually an effort to identify chemical constituents and to attribute to those constituents the medicinal effects. This usually results in putting all the emphasis on a single chemical constituent rather than the synergy of the various constituents. It also ignores the fact that most herbalists prescribe combinations of herbs rather than single herbs so the desire to standardize is based on practices that are not normal in herbal medicine. One could also argue that the emphasis on one constituent over another is simplistic because by isolating a substance from its entirety, we are assuming that the desired effect can be achieved despite the modification of the herb. This focus on single chemicals is however how it is becomes possible to patent herbal components and/or to develop synthetic imitations of herbs.

To standardize an herb, solvents have to be used. Most of these are toxic and they leave residues. So, over and above the contaminants due to herbicide and pesticide use, nuclear fallout, polluted water and air, standardization introduces a host of chemicals, such as hexane, benzene, acetone, etc. that not only contaminate the remedy being made but pollute the environment. That is however only one of the many reasons herbalists object to standardization.

In the U.S., great effort has been made to differentiate dietary supplements from drugs. Most herbs are significantly safer than drugs and, with only a few exceptions, they are regarded as safe. While the dosage can be important, it is rarely critical so insisting on standardization as a way to determine correct dosing is not usual for traditional herbalists. In fact, it is regarded as pseudoscientific by most herbalists.

Biopiracy

Next, because of biopiracy and egregious side effects of pharmaceutical drugs, India is faced with having to document the traditional uses of herbs so as to protect itself from patent hunters. Ashwagandha probably tops the list of targeted herbs, but departments such as AYUSH (Indian Ministry of Health & Family Welfare) are charged with protecting traditions.

Since herbs are not patentable, herbalists are used to offering their services without the immense profits typical of the pharmaceutical industry. Moreover, because of their close connection to the environment, herbalists normally prefer natural remedies to synthetic versions of what Nature Herself offers.

Likewise, in my experience, the majority of reputable herbalists shun standardization of herbs. There are countless reasons for this. Standardization is not a part of our long tradition. The use of herbs goes back thousands of years and every culture has its traditional uses and unique understanding of herbs. Then, as noted, standardization involves the use of toxic chemicals that leave residues in the remedies intended to be used in healing sick people. There is also the point mentioned previously about synergy. All the constituents of an herb make the herb what it is and this is further enhanced by the combinations made with other herbs. The variations and complexities of the variations make simple studies absolutely impossible.

Photograph of St. John's Wort by Ingrid Naiman, 2009

The next important point is that no one knows which ingredient has the most medicinal action. To point out the difficulties, herbalists cite the studies done on echinacea and St. John's wort, but the reality is that one can take any herb and discover that each is unique and complex. Modern science likes to work in a vacuum with a single hypothesis and minimal variables. In the herb world, the variables are celebrated because they are responses to the soil and climate and seasons.

To digress for a moment, let us consider the Ayurvedic theory of accumulation of *pitta dosha* during the summer. In the early part of the season, herbs and vegetables are mild in taste but as the heat increases, so does the bitterness. This is Nature at Her best, not an unacceptable variation in chemical constituents. The moment we refuse to harmonize our behavior with Nature, we invite the consequences, including ill health.

The next example is based on study of Tibetan medicine. About 800 years ago, Tibetans explained that while the active ingredient may address the disease, the other ingredients protect the body from harm while the disease is being cured. I believe this with all my heart and soul so I do not want chemists tinkering with my food and medicine to improve it according to their concepts.

Plant Medicine

The quality of an herb depends a lot on the soil and climate where the herb was grown, the time the plant material was harvested and how it was handled between harvesting and processing, how quickly the raw material was processed and what methods were used in processing the plant material, and how the final material is formulated. There are many variables and these are every day issues for herbalists even if not well understood by the scientific community. Perhaps it would be easier to understand if we compared kale that is picked fresh from the garden and seasoned deliciously to some wilted vegetables that were harvested before mature and shipped thousands of miles before being put on display in a supermarket. If that vegetable is boiled in water until the water soluble nutrients have been extracted and the water is discarded, we no longer have equivalent products even though both might be kale.

Likewise, there are processing methods that are suitable for each herb for its particular intended use and these methods take years to learn so are best addressed by highly qualified herbalists. Moreover, as previously noted, synergy is a very important concept in herbal medicine so the herbs are reactive and interactive in different ways depending on the other ingredients in the formula.

On top of all these complications, there is a further matter to take into account which is that herbalists are very used to substituting one herb for another when an herb is unavailable because of the season or location. The famous Chyawanprash formula is an excellent case in point because wonderful as shatavari and ashwagandha are, they are substitutions, and were not used in the original recipe handed down for posterity.

Potency

Having set this stage, we can return to the issue of potency, and the imagined need to know the potency of an herb before administering it as part of a treatment. We could, for argument's sake ask if it really makes a huge difference whether someone were to consume a teaspoon or three teaspoons of Chyawanprash. Obviously, an observant Ayurvedic doctor would notice subtle changes as a result of consuming more than the recommended amount, but the consequences would be small and not generally worrisome.

Part of the reason for this perhaps casual-sounding approach is that herbs are not generally used to fight a disease directly. For the most part, they work indirectly.

There are very significant differences between allopathic and holistic medicine. For the most part, allopathic medicine is focused on the disease and to wage war on disease, aggressive pharmaceuticals with countless side effects are justified. In any war, there is a risk of collateral damage.

However, in natural medicine, the goal is to heal the patient, and, in many cases, it is not even necessary to have a diagnosis before administering herbs to relieve suffering.

When a medicine is as dangerous as a chemotherapeutic agent, it is obviously very important to control the dosage and monitor the capacity of the patient to survive the treatment. However, there are practically no herbs that are as potentially harmful as pharmaceuticals. Those that are highly toxic are rarely used except in homeopathic potencies. Of course, there are exceptions, but the risks are not comparable so the procedures do not have to be as exact.

Since very few allopaths are trained in herbal medicine, it is understandable that the science behind the herbs seems lacking in areas deemed important to allopaths. Until it is realized that chemicals are very potent whereas herbal formulations are usually quite subtle, the clamor for standardization will probably not abate. To make this point much easier to understand a few points and then examples will be offered.

- Allergic reactions are always possible. This is true with both pharmaceutical and natural medications. Antibiotics, iodine, quinine, ragweeds, and so on and so forth all have the potential for triggering allergic reactions. All practitioners must be aware of such possibilities.

- Interactions between medications are also difficult to estimate but these do need to be factored into any treatment protocol.

- Some safety concerns have been addressed by producers of herbal products through packaging. Most herbs are provided in bottles or pouches with only enough content that if an overzealous patient were to consume the entire contents at once, the worst that would happen might be some vomiting and diarrhea. Though this is not always the case, it is more or less an industry standard except for a few items that are restricted to qualified practitioners.

- Pain relievers and other medications with definite action have been mostly either preempted by the pharmaceutical industry or prohibited so while there are some relaxing herbs with modest sedative or analgesic actions, nothing comparable to codeine or morphine is used by herbalists.

To wrap up this essay, two sketches of famous herbs will be discussed.

Artemisia annua is an excellent example of the Tibetan teaching mentioned earlier. The common name is Sweet Annie. It is one of the most famous anti-malarial herbs and is very gentle in action. Fevers are quickly reduced and the patients are generally cured in six days without major side effects. Perhaps even more important than this is that the plasmodium parasites have not developed resistance to the herb, and the herb can be used again if there is another mosquito bite and another infection. It is assumed that the active ingredient in artemisia is the artemisinin. This chemical cannot be synthesized. Clinical experience has shown that children and pets tolerate the whole herb very well but not artemisinin. Practically no skill at all is required to make an effective herbal remedy with the leaves of the plant; but artemisinin, being a chemical, requires much more training for proper use as well as much more attention to diet and interactions with other medications.

The next example is based on my own researches with Madagascar periwinkle, *Catharanthus roseus*. There are eight varieties, seven African plants and one that grows on the Indian subcontinent. In the Caribbean, descendants of Africans make an anti-diabetic tea from the flowers.

In my darkfield studies, Madagascar periwinkle demonstrated a phenomenal capacity to protect white blood cells. If prior to administering the extract, the cells died within minutes on the slide, a single dose would extend the life expectancy to three hours and a second dose would prolong

the life by yet another three hours. The changes in the chromatin and behavior were dramatic, this using an herbal extract, not one or two constituents that had been isolated from the plant.

Madagascar periwinkle is the mother lode of alkaloids. It is not known how many constituents there are, at least 70, perhaps 120, or even 200 alkaloids. Out of these, two chemotherapeutic drugs have been produced. Vinblastine is used in the treatment of childhood leukemia and Vincristine is used in the treatment of non-Hodgkin's lymphoma.

In the study performed by Dr. Ulrich Abel of Heidelberg University in which hundreds of oncologists in Europe were asked to supply data, the efficacy of chemotherapeutic drugs was stated to be 1% and this was exclusively among what were termed "non-organ cancers" and specifically stated to be childhood leukemia and non-Hodgkin's lymphoma. [2] His findings were published in *Der Spiegel* in 1990.

Concluding the discussion of potency, we cannot compare a tea made from a flower or an herbal extract with chemotherapeutic drugs. Administered in the manner of a typical herbal treatment, there will not be any peripheral neuropathy or hair loss much less sudden death if administered incorrectly. In fact, if one spills some tea on the skin, there will not be any serious consequences, but there are still health benefits so the point is simply that the desire for information must be tempered with common sense. Otherwise, incredibly safe plant medicines will be subjected to completely unnecessary regulations that protect no one.

Endnotes

[1] http://www.abc.net.au/rural/news/content/201303/s3713451.htm

[2] http://www.ncbi.nlm.nih.gov/pubmed/1339108

About the author:

Ingrid Naiman majored in Asian Studies, specializing in philosophy and anthropology. She studied Japanese and Indonesian at the East-West Center at the University of Hawaii and received a B.A. in 1962. She did her graduate studies at Yale University in Development Economics and received an M.A. in 1964. Her contributions to holistic medicine were recognized by Medicina Alternativa which awarded her a doctorate of medicine in Copenhagen in 1987. She received a D.Sc. (honorary) from the Open International University in Sri Lanka, 1995.