



## Biochar Characterization Standards Are Essential to the Success of the Biochar Industry

By: Debbie Reed, IBI Executive Director

**The IBI Mission.** The International Biochar Initiative (IBI) is a non-profit organization whose mission is to promote the development of biochar systems that follow Cradle to Cradle sustainability guidelines. In pursuit of this IBI supports the generation, review and dissemination of credible information on all aspects of biochar; and the development of sustainability guidelines that can be used to monitor and evaluate biochar projects and systems against these guidelines. IBI's success is built on the collective engagement, knowledge, goodwill, and spirit of the global biochar community, and progress in the field of biochar is dependent on the continued collaboration and engagement of this vibrant community.

### Why is IBI Pursuing Standards for Biochar?

IBI's vision is to help attain the commercial viability of sustainable biochar production and utilization at all scales, to enhance the global soil resource and to help combat climate change. It has become increasingly clear to me in the 5 years that I have been with IBI that, before the industry can succeed in these efforts, we must define and be able to succinctly communicate what biochar is, as well as what it is not. To do this, we must establish standards and tests to confirm that a product intended for sale or use as biochar is, indeed, biochar. This is complicated by the fact that biochar is not just one singular material with a narrow set of characteristics or uses; rather, biochar is a spectrum of materials with a range of potential characteristics and uses that are dependent on multiple factors, including feedstock selection and preparation, processing parameters (temperature, time, presence or absence of oxygen, pressure, etc), and use of any post-treatments.

**What is the essence of biochar?** Given the wide range of characteristics and impacts of biochar materials, it is vital that, as an industry, we can identify and describe the *essence* of biochar – those essential characteristics that make it biochar -- and that we can then link these characteristics to its beneficial attributes. Through this process of identification and attribution, we can establish the assurances upon which markets can be built, and a successful and viable industry can thrive. Short of that, we will remain challenged to define biochar and to describe its attributes and explain them scientifically or to create the necessary assurances to build markets that will make the industry commercially viable.

**Biochar is a spectrum of materials.** The fact that the term biochar encompasses a range of materials rather than a singular product is both a blessing and a curse to the field. The spectrum of materials that are biochar have many beneficial environmental and agronomic benefits which have been well-documented. Often, when I describe the many benefits of biochar to someone not familiar with it, I am told that it sounds too good to be true. Yet, biochar does have many significant environmental and agronomic benefits, and the body of literature describing and confirming many of these attributes continues to increase at a rapid pace.

The curse of biochar is that, as a spectrum of materials (which may have very different characteristics depending on how it is produced and from what feedstock), it is challenging to discern the importance and the attributes of each and every characteristic, and to narrow the selection of characteristics that describe the essence of biochar. Since different biochars exhibit different characteristics, and the resulting impacts may or may not be the same across a range of materials, should the standard-setting process identify all the important characteristics of all known biochars, with the understanding that some of the criteria will



not apply to all of the biochars? Or, should the process narrow the criterion selection to only those characteristics that are common to all biochars regardless of pedigree? These are important but complicated decisions to make.

**Biochar exhibits a range of attributes and benefits.** The range of attributes and benefits of biochar materials has complicated the ability of researchers and scientists to ascribe certain findings and impacts to particular traits and characteristics, and similarly confounded the ability of the IBI and the biochar community to articulate clearly which functions and attributes are due to which characteristics. Our ability to explain why some biochars act differently than others, or why some research outcomes are different than others, has not always been as eloquent or as satisfying as it could be. Fortunately, these capabilities are rapidly increasing; an entire segment of the biochar field is now concentrating on producing 'fit-for-purpose' biochars, for instance. This speaks not only to the growth in the field, but also to the rapid nature of scientific progress in the field, such that 'bottom-up' research continues (e.g. biochar is produced, and the attributes and mechanisms are scientifically explored and explained) while top-down research is also underway (e.g. matching identified attributes with specific production parameters, we can create biochars to meet specific soil constraints or ecological challenges).

As the science progresses, so, too, does our ability as a community to better articulate biochar's benefits and attributes. But to take this a step further, and to provide the certainty necessary to create market demand, we need to nail it down, and we need the entire biochar community to participate. To create a successful global industry at all scales will require the establishment of standards that will enable us to build market assurances, and thus markets, for biochar. That is the process that IBI has undertaken.

**IBI's Standard Setting Process**

IBI undertook a process to develop standards for biochar, with the ultimate goal of establishing a certification process. A certification process will establish a set of criteria (the standards) that anyone can use to test their biochar material against. Certification will allow any person or entity producing or selling a biochar material to have their material certified and labeled to show that it is, in fact, biochar, and that it meets established criteria that ensure it is safe for use as a soil amendment, and that it will have certain additional impacts (such as creating a stable carbon sink).

We began in 2009 with an Advisory Committee process and document that laid the groundwork for the standard-setting work that is currently underway. Based on these efforts, we researched standard-setting processes and bodies, and contracted with a leading expert in the field, Leading Carbon Ltd, to help guide the standard setting work in a transparent, fully documented, globally inclusive and open process that was announced at our September, 2010 International Biochar Conference in Rio de Janeiro, Brazil. As Leading Carbon has stated throughout this process, transparency is a cornerstone of the work.

We are just wrapping up the first phase of this work with Leading Carbon, which has resulted in a set of draft standards and a draft prototype label for biochar materials (<http://www.biochar->

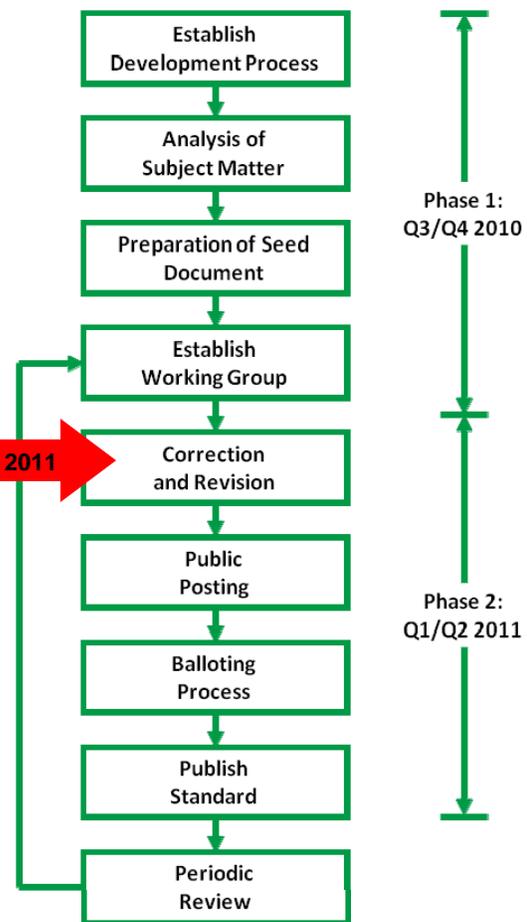


Diagram courtesy of Leading Carbon Ltd



[international.org/characterizationstandard](http://international.org/characterizationstandard)). In the second phase of the work, which has just begun, we will finalize some critical unresolved issues pertaining to the standards, and prior to the final round of public comments, we will bring in experts from the commercial and the end-user community to provide a critical industry perspective to the draft standards. Pending changes to the document to respond to the final public comment process, the standards will be published, and we will work with Leading Carbon to develop a certification process for biochar that is based on these standards. We will strive to complete this process by the beginning of 2012.

### ***Utility to the Commercial Biochar Industry is Essential***

Marketplace certainty is essential to build viable biochar markets, and credible standard-setting processes are essential to establish credible, relevant standards. In order to adhere to national and international standard-setting organizations and processes, and to prove biochar's efficacy as a soil amendment and agricultural product, the standard will need to meet commonly available standardized testing and assessment methods. Since no peer-reviewed, internationally-accepted standards currently exist for biochar—a function of the relative infancy of the industry—we have found that, for this first round of standards, we must identify existing standards and tests to adapt them to the biochar industry. In the future, as published and standardized tests become available, the standards will evolve and be much more specific to biochar, and likely more satisfying to the biochar community.

This first set of standards, which we hope to finalize by 2011 year end, will allow the biochar community to 'test drive' the standards and provide input and experience to IBI that will build on our shared learning to date, and that will inform the development of revised and improved standards over time. The process will also create opportunities for and allow the maturation and availability of peer-reviewed, industry-standard, directly biochar-relevant property tests to be developed, published, and become accessible to the community.

### ***Lessons Learned to Date***

We undertook this effort with the mistaken belief that we could develop a universal set of standards for all uses of biochar, or perhaps tiered approaches based on a standard framework that was inclusive of all potential uses and users (e.g. commercial and non-commercial biochar production, developed and developing country production). What we have learned in the time since we started this effort is the following:

- Qualified experts in international and national standard-setting processes can help IBI to develop a credible, transparent, globally-inclusive, documented process to establish meaningful and useful standards for the biochar industry, but the effort will require resources, patience, time, skill, expertise, and the good-will and considerable voluntary contributions of the global biochar community.
- The standard-setting process will be an iterative process, rather than a static or one-time effort, and will necessarily evolve and improve over time.
- To develop standards for all uses and users of biochar will take multiple separate processes; the current standard-setting process will result in biochar standards for commercial use in developed countries.
  - Due to resource and accessibility constraints of both producers and users in developing country and non-commercial settings, standards for use in developing countries and for non-commercial settings will require a separate effort, relying on expertise relevant to these settings.
  - Non-commercial, developing country standards cannot simply be derived from a narrowed set of criteria from the commercial, industrialized country standards, but must take into account resource and accessibility constraints (e.g. costs or ability to conduct specific tests as well as accessibility of accredited laboratories).
- Research-grade standards, useful for researchers and scientists to characterize biochars, are necessarily different than commercial biochar standards.
- As an immature industry, standardized tests of essential biochar characteristics do not yet exist, leaving us to adapt or rely upon imperfect tests developed for other materials and other uses, but which are widely used.

- IBI is aware that many biochar-specific tests are being developed, and some are even in use in limited circumstances, but until they are published and peer-reviewed, standardized and widely available at accredited laboratories, they cannot be used for the development of credible, accredited standards for the biochar industry.
- As the industry matures and biochar-specific standardized tests become available, we will regularly update the biochar standards to account for these developments, and it is our belief that the standards will improve with each successive iteration.
- It is likely that updates to the standards will be required on a 12-24 month basis for several years, while standardized tests become more available; and every 3-5 years for another decade after that.

### ***What We Envision for the Future***

**This will be an iterative process.** Our job will not end once the standards are published and in use in the marketplace. Besides certifying materials that meet the standards, IBI will work closely to monitor the success and utility of the standards to the commercial biochar industry, and work to establish markets based on the assurances that the standards provide to buyers and sellers of biochar alike. In particular, we will look to the biochar community and commercial entities to report their experiences and satisfaction with the standards. Simultaneously, we will be monitoring changes in the science and research, and when circumstances warrant, we will launch a revision of the standards.

As indicated above, we anticipate that the standards will require revisions every 12-24 months for several years, and every 3-5 years for at least another decade after that.

**Developing country and non-commercial standards.** Concurrently, we will seek to undertake a standard-setting process for biochar that is specific to developing country and non-commercial biochar activities. Based on our experience with the process to date, and our knowledge of non-commercial and developing country biochar systems, we anticipate that these standards may be similar, but we hesitate to make that determination prematurely.

**Sustainability Guidelines.** The current standard-setting process is meant only to characterize biochar materials. It does not include what is necessarily a wholly separate effort, which is to develop sustainability guidelines that deal with ecological, environmental, social, cultural, and other critical issues associated with the production and utilization of biochar. IBI will soon begin a process to develop sustainability guidelines that can be used to monitor and evaluate biochar projects and systems at all scales. We will base this effort on the excellent work already completed by the US Biochar Initiative ([http://www.biochar-international.org/sites/default/files/Biochar\\_Sustainability\\_Protocols\\_March\\_2011\\_Draft.pdf](http://www.biochar-international.org/sites/default/files/Biochar_Sustainability_Protocols_March_2011_Draft.pdf)) and we will rely on biochar sustainability research results (<http://www.biochar-international.org/sustainability>) from the international community of biochar researchers. In addition, we will be able to build on extensive sustainability guidelines for general biomass use available from the Roundtable on Sustainable Biofuels ([http://www.bioenergywiki.net/index.php/Roundtable\\_on\\_Sustainable\\_Biofuels](http://www.bioenergywiki.net/index.php/Roundtable_on_Sustainable_Biofuels)) and the Forest Stewardship Council (<http://www.fsc.org>).

### ***IBI Expresses Our Sincere Appreciation to the IBI Community***

In closing, we would like to again express our sincere appreciation to the vibrant and devoted biochar community that has made our work possible and that continues to support us in our endeavors to commercialize biochar and to achieve the many successful outcomes that sustainable biochar systems can achieve. We would especially like to thank the many people who have devoted their time and expertise to developing the biochar standards, upon whose knowledge and goodwill we will continue to rely.

