



## Plant Health Care Inc.

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# Technical Bulletin

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## Organic vs. Natural: What Do They Mean?

The term “organic” has numerous uses and meanings depending on whether the context is scientific, colloquial, or political. This has caused considerable confusion when attempting to describe or characterize products or ingredients as being “organic”. In scientific terms, the word “organic” has two different uses. One is chemical, the other is biological.

### ***Chemical Definition***

A substance is considered to be “organic” if its molecular structure is based on the bonding properties of the carbon atom. Essentially, any molecule containing carbon, with a few exceptions, is considered to be “organic”. There are very few examples of “inorganic” carbon molecules. The most notable example would be carbon dioxide (CO<sub>2</sub>), which is often considered as “inorganic” because it has not yet been “fixed” into an organic molecule by plants. In fact all carbon compounds can have their carbon component traced back to carbon fixed by plants in photosynthesis. The chemical definition of “organic” is at the center of the science of organic chemistry. Inorganic chemistry deals with substances that do not contain carbon and are mainly of mineral origin.

### ***Biological Definition***

Since most biologists are also chemists by training, the chemical definition mentioned above is in wide use in biological circles. However, there is an older definition from classical biology: a substance is “organic” if it is derived from a living organism. Typically, such substances would also be based on carbon, so they would adhere to the chemical definition as well. However, the speaker may be referring to the source of the substance rather than to its chemistry. This is an important distinction. The same substance might be “organic” by the chemical definition, but not so by the biological definition. For example:

Formononetin is a stimulant of VAM fungi. It’s molecular structure is based on carbon. It occurs naturally in clover and other plants, however, it is synthesized in the laboratory for commercial use. Is it organic?

Using the chemical definition, formononetin is always “organic” because its molecular structure is based on carbon. But using the classical biological definition, formononetin would only be considered “organic” if the particular sample under discussion had been obtained directly from plants. If the sample had been synthesized by chemists in the lab, then the material would not be considered “organic” by the classical biologists’ definition. It would be considered “synthetic”. Even though all the carbon in the organic chemicals used to synthesize compounds like formononetin originally came from plants, the compounds are still considered synthetic unless they are taken directly from their natural source.

### ***Colloquial Definition***

Some people attempt to clarify this distinction by using the terms “natural” vs. “synthetic”. Here the word “natural” means “from nature” while the word “synthetic” means “man-made”. But this only complicates the problem, because there are many natural substances that are neither based on carbon nor derived from living things. Most minerals fall into this category. They are natural since they are derived from nature, but they are not from living things, and they are not based on carbon. So are they organic? This leads to the political definition of “organic”:

### ***Political Definition***

A current theory in vogue today is the concept that foods that are produced naturally, that is, without the use of synthetic materials, are tastier, healthier, or both. In order for a food product to be designated as “organically grown”, it must adhere to rules designed to ensure that the production and handling processes are natural rather than synthetic. But when establishing an “organic” program, one runs directly into the problems of interpretation cited above. What constitutes “organic” ingredients? Generally, organic certification prefers the classical biological definition, combined with the concept of natural vs. synthetic.

Unfortunately, practical problems complicate the organic program. Plants require inorganic components (chemically speaking) for their nutrition: light, water, carbon dioxide, and various minerals. While all of these are available in nature, there are some problems with interpretation. For example, while water is natural, can chlorinated water be used? When using light, must one rely solely on sunlight, or can artificial light be used? Can commercially manufactured fertilizers be used? What determines whether a mineral fertilizer can be classified as acceptable for organic certification? All of these questions can be considered political, because they are designed to satisfy a perceived human distinction rather than a biological one. In fact, the plant can't tell whether the light is natural or artificial, or whether the nitrogen source came from man-made, inorganic ammonium nitrate or from the decomposition of natural, organic amino acids.

### ***What About Organic Certification?***

Because of these different meanings of the word “organic”, organic certification programs have rapidly ballooned into an elaborate and expensive process to determine which processes, ingredients, or chemicals will be considered natural and acceptable, or which can be granted a variance. To receive organic certification, it is not enough that all the ingredients are natural. In some cases, whole classes of fertilizers are not allowed. For example, micronutrient fertilizers are not allowed for organic farming, except in cases where the farmer can clearly demonstrate that his soil is significantly deficient in the specific micronutrient being added. In such cases, the product itself cannot receive independent approval for organic use. Instead, the individual farmer must seek a variance.

The legal or political considerations will determine which Plant Health Care, Inc. products can be used for organic farming. Such products need not be all organic. Ingredients approved for organic farming include both organic and inorganic substances. Most of these are natural, but even some synthetic substances have been approved for organic farming. So a product that is certified for use in organic farming need not be “all organic” nor “all natural”. In the USA, chemicals that are more likely to be accepted for organic certification are those that appear on EPA's List 4 of inert ingredients Generally Regarded As Safe (GRAS). This list was designed by EPA for pesticides, but has been adopted as a reference by organic certification programs. Chemicals become accepted when they are submitted for an exception or waiver, are approved in the petition process, and are

granted the status of an “Approved Synthetic”. Currently, the organic certification program is relatively new, and there is need for review of a lot of materials.

For more information about Organic Certification programs, visit the following web sites:

Organic Materials Review Institute (OMRI): [www.omri.org](http://www.omri.org)

National Organic Program (NOP): [www.ams.usda.gov/nop/](http://www.ams.usda.gov/nop/)

### ***Summary***

The word “organic” is not a cut-and-dried term. Its intended meaning depends largely on the context in which it is used. It has roots in biology, chemistry, and lately, in politics. When you encounter the word “organic” it is advisable to first determine which of these three categories best describes the current mindset of the speaker. This will usually dictate the particular definition intended. The word natural is easier to define. It means “derived from nature”. It does not necessarily mean “organic”.

Plant Health Care, Inc. makes several products that are composed of only natural ingredients, such as Healthy Turf 8-1-9. However, merely being composed of all natural ingredients does not make it an “organic” product. While many ingredients are indeed “organic”, like bone meal or kelp meal, other ingredients include natural, inorganic minerals, such as sulfate of potash and nitrate of soda. Even products that are acceptable for use in organic farming cannot be labeled as “All Organic” when they actually include natural inorganic minerals. The words “organic” and “natural” do not have the same meaning. Therefore, PHC uses the phrases “All Natural” or “100% Natural” when describing a product like a 100% Natural Biofertilizer.