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# Technical Bulletin

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## WHY DO SOME PRODUCTS EXPIRE?



Many PHC products contain live organisms, like mycorrhizal fungi or rhizosphere bacteria. The numbers of live spores per unit weight are shown on the label, along with an expiration date. Living things don't live forever. Over time, the numbers bacteria or fungi will begin to decline as they start dying off one by one. The expiration date provides a time frame in which the numbers shown on the label are still reliable. After the expiration date, we can no longer guarantee that these numbers are still accurate. The expiration date refers to *dry* product. Once it is mixed with water, a bacterial product should be applied within 12 hours. Otherwise, the solution may begin to ferment.

### ***What Happens After the Expiration Date?***

After the expiration date, the bacteria and fungi are still there, but their numbers may be lower than the label states. It all depends on how long it has been since the product has expired.

### ***What Happens to the Fertilizer Grade?***

If the product also provides fertilizer, the dry fertilizer ingredients in the product will not expire. So all the label information relating to the dry fertilizer content remains accurate even after the expiration date.

### ***What Happens if I Use Expired Product?***

Expired products can still be used. The expiration date refers only to the *numbers* of microbes shown on the label. So expired products may deliver fewer bacteria or fungi. As more time passes, the counts will drop lower and lower. But some of the microbes will last a good while longer. And since the microbes will reproduce and proliferate after they are applied, the plant may still get the benefit of these microbes, although it may take a while longer. Also, the value of the fertilizer ingredients will be unaffected. In any case, the plants will still benefit from use of the product.

### ***How Fast do the Microbes Die After the Expiration Date?***

The microbes don't all die at once. Instead, they decline gradually. Once the expiration date is reached, we can no longer guarantee that the label counts are still accurate. But the majority of the microbes are likely to be still alive. They die off in a manner called a "half-life." For example, with bacteria spores, it may take over 2 years past the expiration date for the label counts to drop by 50%, and another 2 years to drop another 50%. Of course, this also varies by species.

### ***How is the Expiration Date Determined?***

The expiration date is based on the shortest-lived ingredient. The time clock starts as soon as the ingredient is produced, and not when it is blended into the final product. Typically, different classes of microbes have different life spans. Here are a few of the more common ones:

- *Trichoderma* fungi spores: about 12 months
- Rhizosphere bacteria spores: at least 2-years, **and these can be added in higher amounts so the label count will last 3 years.**
- VAM Fungi spores: at least 3 years
- Ectomycorrhizal Fungi spores: at least 4 years

So a product that contained all of the above microbes would have an expiration date determined by the *Trichoderma*, since it is the first start declining in counts. Note that the shelf life begins on the date that the live ingredient (not the finished product) is produced.

### ***How Does PHC Achieve a Shelf Life Longer than 2 Years for Bacterial Products?***

Rhizosphere bacteria spores live at least 2-years. But as noted above, these can be added in higher amounts so the label count will last 3 years. That is what we have done. PHC formulates its bacteria products with significantly more bacteria than the label claims. That way, it takes 3 years for the counts to drop down to the numbers shown on the label.

### ***When My Customers Buy a Bacteria Product, The Expiration Date Is Never 3 Years Away. Why is That?***

The bacteria don't wait for the customer to buy the product. The time clock starts as soon as the bacteria are produced. So the bacterial ingredient is dated when it is made, and the 2-years count life begins on that day. Even though we add extra bacteria to extend the shelf life, no one will ever buy the product on the same day that the bacterial ingredient is made. Besides, some of that time has already elapsed before PHC personnel blend the ingredient into the product.

However, people may easily see expiration dates with 12 to 25 months remaining. The amount of time remaining also depends on how long the product remains on the shelf at the distributor before it is sold.