

## Anti-GMO myth busted—We're not losing plant genetic diversity after all

It's been a familiar meme for some time — anti-GMO activists blaming genetically engineered crops for a drastic loss of diversity. The magazine National Geographic even got into the game, publishing a graphic showing an apparently catastrophic 97 per cent loss of diversity in crops between 1903 and today. The graphic, the esteemed magazine claimed, showed how “As we’ve come to depend on a handful of commercial varieties of fruits and vegetables, thousands of heirloom varieties have disappeared.”

[food-variety-tree-754](#)

Anti-GMO sites like Mike Adams' [Natural News](#) quoted other similarly minded activists who have no expertise in science or genetics such as risk expert Nassim Taleb, in [warning](#) that genetic engineering would lead to nothing less than the end of the world. Why? “Because the rise of GMOs is nearly synonymous with the collapse of genetic diversity in seeds and food crops.”

Activist and philosopher Vandana Shiva regularly claims that GMOs are “a death knell to biodiversity:”

Even the UN's Food and Agriculture Organization (FAO) [decried](#) a 75 percent reduction in crop diversity, and called for a push to store and use wild crop relatives.

While the FAO's call is not a bad idea, has there actually been a diversity decline? The truth is, these claims are flat wrong. We have not lost much diversity at all over the past 100 years. How did so many people get this so wrong?

### Comparing the wrong apples and oranges

These claims of diversity loss claims are almost entirely based on a study completed in 1983 by the Rural Advancement Foundation International (RAFI), which was never published and never went through peer review. However, it was publicized heavily by the FAO among other organizations and authors. The study compared a 1903 US Department of Agriculture survey of seed catalogues. The RAFI study claimed that only 3 percent of the seed varieties available in 1903 were still available 80 years later. Garden bean varieties, for example, fell from 185 varieties in 1903 to 32 in 1983. Lettuce varieties fell from 107 to 36, and tomato varieties plummeted from 408 to 79. Thus, the RAFI study concluded, only 3 percent of what was available in 1903 remained today.

There's a big problem with this report. By comparing seed catalogues in 2004 with the 1903 seed catalogues, two [University of Georgia researchers found](#) that, for 48 vegetables, farmers in 2004 instead had just as many varieties to choose from as did farmers in 1903. In fact, varieties of several crops had increased drastically. Paul Heald and Susannah Chapman reported 7,100 varieties of crops in existence in 2004, compared to 7,262 varieties of crops in 1903. For garden beans, the number of varieties rose from 185 to 771, while lettuce varieties rose from 107 to 520, and tomatoes skyrocketed, from 408 to 1,536.

What accounted for this? The RAFI researchers simply looked at whether the varieties for sale in 1903 were still for sale in 1983. They did not account for the fact that crop variety has increased in many ways

not reflected in the data they cited: preservation efforts including intensive seed banking, imported varieties of seeds to the United States, and innovators who have bred new varieties (including synthetic wheats, new hybrids, and yes, genetically modified organisms).

Another problem that explained the understatement of diversity numbers were the nature of varieties themselves. Namely, many varieties noted in the early 1900s did not represent different species; rather they were just the same rose (or tomato) by another name. The original author of the [1903 USDA study](#), William Tracy, made that clear. He conducted his research, he said, because “variety names of vegetables in this country are being greatly multiplied every year by the renaming of old varieties.” For example, while Tracy found 578 named varieties of garden beans, only 185 of those were truly distinct. So wiping out nearly 400 varieties represented zero loss of diversity; it was just a book clean up.

### **History of fake varieties**

By the early 20th century, seed-saving was starting to lose its dominance to market production. By the 1930s, more than 300 companies offered seeds through 35 million catalogues. 60 percent of vegetable seeds were commercial, instead of home-saved. About 7,000 varieties of apples arose between 1804 and 1904, and 1,362 varieties of strawberries were described in 1925. But how many of these were actually varieties?

Many varieties [were the same plant](#), or an outright fake, with the lister trying to suggest it was a new variety. In California, nurseries were found to be flooding markets with varieties that, well, weren't. Grafting on to rootstock meant being able to clone an unlimited number of identical plants with easily identifiable characteristics (color, size, shape, growing ease, flavor). But unscrupulous operators also could sell exact copies of another variety, or a complete forgery. “Every man his own nurseryman” started to mean that everybody could have his own variety, whether or not it was truly a new varietal. This ongoing scam was one of the reasons for the 1930 Plant Patent Act, which initially protected only non-sexually reproducing plants, such as those sold by nurseries.

### **Waves of diversity**

Crop diversity may not be waning, but it has been variable, at least over the past century. In a meta analysis published in 2010, researchers from Wageningen University in The Netherlands concluded that [no substantial reduction](#) in diversity of crop varieties occurred in the 20th century. In other words, National Geographic, et al. did not do their homework (and cranks and quacks like Taleb and Adams couldn't care less about the truth; they're just propaganda pushers). The Dutch scientists did, however, see a dip in diversity in the 1960s in wheat and other crops, but a subsequent increase in diversity in the 1980s through the 1990s. This group's study overlapped somewhat with the University of Georgia study and ascribed the improvement to gene banks, better communications among breeders and easier seed exchange.

Ironically, many anti-GMO activists tout heirlooms and other so-called “naturally grown” varieties of seeds and plants as alternatives to modern, large-scale agriculture. But heirloom isn't a precise, scientific term—it can mean nearly anything to anybody, just as the name of a tomato, potato or lettuce variety

meant nearly nothing 100 years ago. As the advances of the 1960s and 1970s Green Revolution showed, focusing on the past is no way to prepare for feeding future mouths.

**[Andrew Porterfield](#)** is a writer, editor and communications consultant for academic institutions, companies and non-profits in the life sciences. He is based in Camarillo, California. Follow **[@AMPorterfield](#)** on Twitter.