

Nassim Taleb's Precautionary Principle nonsense and warped "GMO" pseudo-category

The Precautionary approach is formulated in the Declaration on Environment and Development (Rio de Janeiro, 1992), Principle 15. Originally created with the aim of protecting the environment—to push governments to adopt preventative policies against “threats” of environmental damage, even in the absence of sure scientific evidence—in its subsequent interpretation by the [European Commission](#) (2000) it was called the Precautionary Principle (PP) and was then extended to cover policies to safeguard consumers and human animal and plant health.

This is all fine if decisions are adopted correctly and empirically founded. The Commission's declaration embodied that measured approach, including the sentence: “A decision to invoke the precautionary principle does not mean that the measures will be adopted on an arbitrary or discriminatory basis.” Defensive initiatives which are sought on environmental or health grounds were supposed to always be based on “detailed scientific and other objective information”.

Following this well-constructed framework, any attempt to apply the PP to “GMOs” is meaningless. Why is this? The basic point is that “GMO” is an arbitrary, fake category that lumps together many different agricultural products, with various traits, obtained through several processes; in certain cases genetic sequences from other species are spliced in the target genome (transgenesis); in other cases, there is no addition of DNA, but some genes may be “knocked out”; sometimes, the same desired traits can be obtained via different methods, such as mutagenesis, which involves changing the genetic structure of an organism using chemicals or radiation, which while creating thousands of random mutations is not legally considered “GMOs”.

Moreover, the bogus concept of “GMOs” has blurred, indefinable borders: we can have plants grafted on DNA recombinant rootstock (a “halved-GMO”?!); new crops obtained with little changes that are first inserted in their genome, then [deleted](#); cultivars whose genetic structure is left intact, but epigenetically maneuvered so as to obtain some interesting results. The “anti-GMO” brigade, often inspired by ideological or anti-industrial motivations, have for some decades been fighting a quixotic windmill.

Thus, it is no paradox to affirm that, since it is no object, “GMOs” cannot be a subject: there are no general characteristics that may be considered in order to theoretically foresee or empirically ascertain a supposed all-encompassing environmental or health impact. Consequently, any effort to evaluate something that has no semantic sense or reference, let alone apply the PP to it, is simply nonsensical. Period.

The situation gets even worse if an attempt to distort the PP goes together with a basic misunderstanding of what “GMOs” are supposed to be, creating absolutely outlandish outcomes (to use a polite term): this is the case of a [paper](#) (not peer-reviewed) whose first author is [Nassim Taleb](#), an expert in risk engineering famous for his predictions of a Black Swan event that could, and in fact did, endanger the world financial system.

As I have discussed in an article in [Nature Biotechnology](#), “The nonsensical GMO pseudo-category and a precautionary rabbit hole”, there are many mistakes in their analyses. Here I will focus only on some major flaws.

The PP, the authors state, must be invoked only when extreme danger is predicted, the consequences of which “can involve total irreversible ruin, such as the extinction of human beings or all life on the planet”. The suitably stunned reader understands that the Principle should, in short, be applied only in the case of some apocalyptic prospect. Fasten your belts, because this is the case of “GM” crops.

“GMOs have the propensity to spread uncontrollably, and thus their risks cannot be localized,” the authors claim. (The following quotes are all taken from pages 7-9). Quite a weird statement. What vegetal organism could possibly ever spread compulsively across the planet? And even if we admit that there are cultivars which are so invasive as to be compared, it seems, to a global pandemic, in what sense would this characteristic be linked to the degree to which they are DNA-spliced? And to express which traits? The first unjustified catastrophic claim.

“GMOs” are in this view the globe’s Damocles’ sword, hanging over humanity. So must we therefore be terrified when faced with a field of [Amflora](#) (transgenic) potatoes, but feel safe if it is a field of (mutagenized) [Super potatoes](#), even if the two varieties express the same phenotype, i.e. absence of a certain type of starch? Should we be frightened by Roundup Ready maize (transgenic and tolerant to the herbicide glyphosate) and feel no fear before the adjacent field of Clearfield maize (mutagenized, tolerant to a different type of herbicide)? Are we running catastrophic environmental risks if we engineer a trait of the sunflower’s genome to make it tolerant to a herbicide, but instead we save the world *in extremis* if we discover that a variety with that trait has emerged due to natural mutation, and so we turn to hybrid forms which have been crossed in the traditional way with the “natural” variety? Will DNA-spliced sugar beets propagate endlessly, while their normal “cousins” will calmly stay in their fields? What planet do these authors live on?

Immediately after, the reader learns that “Monoculture in combination with genetic engineering dramatically increases the risks being taken.” A completely unjustified statement: “generic engineering” means a lot of different things; therefore in the sentence quoted it means nothing. Let’s just give a couple of examples. Take a blooming, vast field of peanuts, a typical “non-GMO” monoculture; a reputable biotechnologist goes to the farmer and proposes replacing all the plants with identical plants, in which, however, his/her laboratory has managed to silence the gene which produces allergic effects in so many [consumers](#). A done deal; the whole field – and we hope, soon, the whole global crop of tasty peanuts – is “GMO”: this, according to the authors, would enormously increase the risk of (global) “ruin”....

Another situation: a [genetic modification](#), made at a university, would help repopulate the seriously threatened [American chestnut](#), a variety which was almost wiped out in the 20th century by an invasive species of Asian fungus; many chestnut plantations would be restored, in some areas there would be “GMO” monocultures: this, according to the authors, would dramatically increase the risk of (planetary) “ruin”....

Even assuming that the theoretical risk analyses preliminary outlined by the authors are valid, the whole structure collapses when they want to apply the PP to...to *what?* “GMOs”, again, are not *something* — a class or category or collection of any kind — which has a minimum common denominator in any sense that regards the environment or health; and even less so in terms of their danger, generically or very superficially speaking. But... wait a minute: does not every cultivar bring with it a certain level of risk, which must absolutely be taken into consideration? Of course they do — *whether they are a “GMO” or obtained through any other biotech method or “natural”*: and so we should do environmental impact studies and health assessment for the release of any new varieties. Case by case, locally.

It is then highlighted that genetic engineering can “manipulate large sets of interdependent factors at the same time, with dramatic risks of unintended consequences”: absolutely no explanation is offered as to what these interlaced, interdependent factors might be and how serious risks might derive from them. Perhaps it is intended that DNA-splicing can bring with it undesired consequences, since the spontaneous reorganization of the modified genome not infrequently generates, in its wake, phenotypical modifications which cancel out the advantages: this is perfectly true, and in fact we have [lists](#) of [failed](#) “[GMOs](#)”, which ended up in the waste bin because the results of the transformation were unsatisfactory. The same phenomenon can be expected, and in fact has happened on several occasions, in creating new varieties *through traditional methods*; just to give three examples: a squash with toxic properties; a variety of [celery](#) resistant to certain insects, which brought out rashes in whoever handled it; a highly toxic potato, brand name [Lenape](#).

For this very reason, as scientists never stop recommending, analyses of health and environmental impacts must be done case by case, analyzing every single *product*, regardless of the biotech *processes* used to create them, none of which inherently has greater or lesser risks. A [petition](#) signed by thousands of biologists and geneticists, including 25 Nobel-prize laureates, states: “No food products, whether produced with recombinant DNA techniques or with more traditional methods, are totally without risk. The risks posed by foods are a function of the biological characteristics of those foods and the specific genes that have been used, not of the processes employed in their development.” Instead, these unforeseeable genotypic-phenotypical trends, which can only be ascertained *singularly* and *a posteriori*, are attributed by Taleb as a *plurality* and *a priori* only to “GMOs”, which “place a huge risk on the food system as a whole”.

To say that these are disproportionate, pointless claims is not enough: one seems to be reading one of those fantastically apocalyptic websites. However, unlike such amateur scaremongering, which can only make you smile, the terrifying forecasts are here presented as inevitably deriving from the correct, scientific application of the Precautionary Principle. A reader who has limited knowledge of what “GMOs” are (or, better, *are not*) cannot fail to be struck by the sense of presumption displayed here.

The paper in question is unfortunately an excellent example of “[agnotology](#)” — the creation or strengthening of ignorance and misinformation. Here we see an author who is considered outstanding in his field, with a cohort of co-authors, talk gibberish about global environmental holocaust caused by...well, by something that they cannot even consistently define. A few leading academics in various fields besides life sciences, when faced with “GMOs”, literally freak out; and we do not have any convincing and full explanation of this phenomenon.

The text in question has circulated for a while as a short draft; now it has been expanded and presented in what appears to be its final version. It has not seen subject-to-peer review. The [ideas](#) put forward are [already receiving many](#) well-founded [criticisms](#); an attempt at official publication in an authoritative scientific journal would most probably see the paper massacred: of course it should be subject to review by people who know something about agronomy, biology and genetics—and logic.

Recently, Professor Taleb reacted in such a nasty way to those who criticized his “[anti-GMO” stance](#) that somebody has even launched a [petition](#) to have him sacked by his university for misconduct.

Will he see reason and acknowledge that all his messy and pointless PP-“GMO” lucubrations are just a big mistake? I hope so.

Giovanni Tagliabue is an Italian philosopher of life sciences: his comprehensive book “*GMOs*”: A Scientific-political Dialogue on a Meaningless Category will be published in 2016.