



# Normative Concepts of Nature in the GMO Protest. A Qualitative Content Analysis of Position Papers Criticizing Green Genetic Engineering in Germany

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## Abstract

*New Breeding Techniques* such as CRISPR-Cas9 are revolutionizing plant breeding and food production. Experts believe that the social debate about these technologies could be similar to those on green genetic engineering: emotional and highly controversial. Future debate about Genome Editing could benefit from a better understanding of the GMO (genetically modified organism) controversy. Against this background, this paper (a) presents results of a content analysis of position papers criticizing green genetic engineering in Germany. In particular, (b) it focuses on the controversy as a place where normative concepts of nature are debated and become visible. Hence, the study complements existing interpretations by showing that the emerging concepts are more diverse than the familiar reductionist breakdown of the debate into anthropocentric vs. non-anthropocentric conceptions suggests.

**Keywords** Green genetic engineering · GMO · Philosophy of nature · Descriptive ethics

## A Structuring Retrospective on the GMO Protest

*New Breeding Techniques* such as CRISPR-Cas9 are revolutionizing plant breeding and food production. Experts believe that the social debate about these technologies may turn out to be similar to the one about green genetic engineering in the last decades: namely, emotional and highly controversial (see Bechtold et al. 2018). Green genetic engineering is undoubtedly one of the most controversial technologies in the history of the Federal Republic of Germany and people have become accustomed to the fact that a technique of plant breeding leads to heated debates, however, this fact could also cause astonishment: Why is the dispute so vehement and uncompromising? How can it be that after decades of debate in a so-called “knowledge-based society” there is no consensus, not even a rapprochement of the positions? Since the future

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debate about genome editing could benefit from a better understanding of the GMO controversy, this paper puts forward the following research question: What concrete objections and points of criticism have been raised against the use of green genetic engineering in the German GMO protest? The analysis will expose different fields of criticism. The focus will be on specific concepts of nature used in the protest.

This is done for different reasons: The study will not only complement existing interpretations by showing that the emerging concepts of nature are more diverse than the familiar reductionist breakdown of the debate into anthropocentric vs. non-anthropocentric conceptions suggests. At a more fundamental level, the article promotes a descriptive approach in the field of environmental ethics. While normative works try to provide a justified answer to the question of how to act from a moral perspective (Düwell 2008, 36), descriptive ethics strive for a better understanding of a moral problem, describing it not only in its ethical framework but also in its historical and cultural tradition (Fischer 2001, 165ff.; Lesch 2006). In particular, debates on environmental issues can benefit from such a descriptive approach (see also Ott 2010, 8 f. and Reder 2013, 83). The focus, for instance, will then not be on the question of how we should deal with nature, but rather: How is the term actually used in social debates? What ideas are associated with the term?

The paper is structured as follows: Chapter 1 describes the methods used in the study; Chapter 2 presents the most important results; Chapter 3 discusses these results, focusing on the ways in which the term “nature” is used; and Chapter 4 looks briefly at the outlook for the debate, examining in particular the use of the so-called “Online Ethics Council” as a tool to promote ethical judgements about concrete plant breeding scenarios.

## Method: Content Analysis

In order to gain a better understanding of the GMO controversy in Germany, a qualitative content analysis following the methodology presented by Mayring (2003) was carried out. Since the *protest* against GMO is a vital driving force in the whole debate, the analysis focused on information brochures *criticizing* the use of genetic engineering in agriculture. After more than two decades of discussion, these brochures can be seen as a kind of “assembly point” for arguments that have proven themselves in the field of protest.

In-depth online research identified key stakeholders in the genetic engineering critical discourse in Germany, including environmental associations, NGOs and GMO-free regions. The information brochures on green genetic engineering published by these stakeholders were the raw material of the content analysis.<sup>1</sup> They meet the general criteria that are – according to Kromrey – decisive for determining the material in a content analysis: The texts must exist, they must be accessible and they must be relevant to the aim of the study (Kromrey 1983, 173). In the present context, the analyzed position papers had to be clearly identifiable as critical of green genetic engineering, German speaking and available via online contact. The primary analytical question of the analysis was: “What concrete objections and points of criticism are raised against the use of green genetic engineering in these position papers?” Follow-up questions dealt with the task of structuring and categorizing the arguments.

<sup>1</sup> Position papers of following stakeholders were analyzed: Greenpeace e.V., Informationsdienst Gentechnik, Bioland e.V. Verband für organisch-biologischen Landbau, Gen-ethisches Netzwerk e.V., Bund für Umwelt und Naturschutz Deutschland e.V. (BUND), Bündnis gentechnikfreier Landkreis (Roth + Schwabach), Bündnis Bayern für gentechnikfreie Natur und Landwirtschaft, Umweltinstitut München e.V., Bund Naturschutz in Bayern e.V., [www.vielfalterleben.info](http://www.vielfalterleben.info), Bürgerinitiative „Das Leben befreien“, „SEIN“, „genfoodneidanke“.

In general terms, qualitative content analyses aim to analyze texts in a systematic and theory-based way by gradually processing the raw material via a system of categories into a specific corpus of text that represents, and illuminates, the original material (see Mayring 2003, 114 f.). As such, qualitative content analysis does not involve quantitative assertions. It is a heuristic exploration of the substantial content of an argument or position. Developing Mayring (2003), Kuckartz sets out the following pair of concrete steps in qualitative content analysis (see Kuckartz 2012, 78): (a) An initiating first round of work on the texts, marking important passages is followed by (b) the development of a first draft of a system of main categories. Other authors, such as Ramsenthaler, point out that the system of categories is ideally obtained not only inductively, by working on the material, but also deductively, by referring to previous studies and the current state of research (see Ramsenthaler 2013, 29 ff). A first test run checks the general adequacy of this system. Several things are done after that: (c) the material is coded using the categories; (d) all text passages coded with the same category are compiled together; (e) working directly on the raw material, subcategories (if appropriate) are obtained inductively, and pretests are carried out to check and refine the system of main categories and subcategories. Finally, (f) the material as a whole is coded using the differentiated system. At this point (g) discussion of the results can begin.

The present study followed these steps. As theoretical reference, previous interpretations of the controversy (such as Korthals 2003, Busch and Prütz 2008, Müller-Röber et al. 2009) were used in order to develop – in combination with the work on the material itself – the main categories (see below). In total, 32 position papers dating from 2006 to 2015 were analyzed. The analysis identified 352 arguments. Each was assigned to a main category and additionally tagged with a keyword indicating a subcategory, i.e. what was recognized as essential to the content of an argument was translated into a short, paraphrased form. The steps of the qualitative content analysis can be illustrated by the following example: the information brochure “Gentechnik – Manipuliertes Leben” (*Genetic Engineering – Manipulated Life*), published by the *Umweltinstitut München e.V.* in 2010, states the following on p. 15:

Bt-plants pose a considerable risk to the environment because the poison not only affects pests, but also beneficial insects. Studies have shown negative effects on various butterfly species, earthworms and numerous other insects (Umweltinstitut München 2010, 15).<sup>2</sup>

This passage (a) was understood as an argument against the use of green genetic engineering. (b) It was summed up by being placed in the main category *Risks*, and (c) tagged with the keyword (subcategory) *Non-target organism*.

## Results: Main Categories and Subcategories

### Three Fields of Criticism

As the main dimensions of the protest, three fields of criticism (or *main categories*) were identified in the analysis: the protest addresses (2.1.1) specific *Risks* to human health and the environment, (2.1.2) *Social Aspects* of implementing genetic engineering, and (2.1.3)

<sup>2</sup> Paper author’s translation; all excerpts in English in this paper were translated by the author.

fundamental questions about the appropriate *Relationship between Man and Nature*. These, and their subcategories, will now be explained in more detail.

## Risks

The critical discussion mentions negative effects on human health and the environment. These may be direct effects or side-effects. The identified arguments were tagged with following keywords as subcategories (indicated in *italics*)<sup>3</sup>: GMOs promote *resistant pests* and *superweeds*; they cause *ecological damage by monoculture* (as a side-effect of the usage of green genetic engineering), the *impairment of ecological balance* in general, the *contamination of soil and groundwater* (as a side-effect), *environmental damage, especially in other regions of the world* (as a side-effect) and involve *increased use of insecticides* (as a side-effect). They are a threat to *non-target organisms* and to *biodiversity* in general; the usage of GMOs is *ecologically irreversible* and generally threatens to introduce *uncontrollable risks* to the environment. In regard to human health, GMOs lead to *antibiotic resistance* and an *increased incidence of allergies*. Generally, GMOs are *pathogenic* for humans and animals. Fed with GMO-feeds, for example, *animals suffer from diseases*. There are *no (long-term) studies* of the consequences of GMO use. Since genetic modification is a *complex matter*, the usage of GMOs is a *game of chance*. (These last three keywords exhibit overlaps with the following field, *Social Aspects*.)

## Social Aspects

Arguments about *Social Aspects* were tagged with the following keywords as subcategories: GMOs generally lead to *industrial agriculture* (which is seen critically in the brochures and stands for a kind of agriculture which subordinates everything to the goal of maximum output). They are a *threat to small-scale agriculture* and also involve the general *loss of jobs in agriculture*. In the context of GMOs, *agriculture becomes more and more dependent on large companies*. Furthermore, *GMOs replace traditional crops*.

According to the position papers, green genetic engineering is *rejected by the majority* of people in Germany and is a *threat to consumer's freedom of choice*. GMOs involve *unfair patents* and lead to *market monopolies*. Certain corporations (using and selling GMOs) are *abusing their power* (e.g. with regard to farmers); they are influencing politics with their *lobbyism*, are *only interested in their own profit* and are *controlling the whole food market*.

GMOs are a *threat to traditional food* as a cultural asset, and also a *threat to organic agriculture*, especially since *coexistence is impossible*. Furthermore, *GMO-free agriculture* has *additional costs* as well as serious *insurance problems*. In this context, GMOs are a *threat to freedom of occupation* (i.e. they jeopardize the jobs of farmers who want to work GMO-free) and they *endanger social peace* in general.

The *scientists* (working in the field of GMOs) are *working with and for big companies*. The identified arguments in the brochures show *general mistrust in the sciences*, *mistrust in political players, institutions and processes* and *mistrust in the whole risk assessment process*. (Since mistrust plays a vital role in the GMO protest, the specific arguments in this context are elaborated further under 3.1.) All promises made in the past about the benefits of GMOs were

<sup>3</sup> The following arguments do not represent the view of the author but the view of the analyzed position papers. For reasons of easier legibility, the subjunctive was avoided.

wrong (*empty promises about benefits*). In particular, GMOs will *never solve the problem of world hunger*. Generally, GMOs do not deliver real benefits for Germany (*missing benefits*). They can do *damage to the image of food production across a whole region*; they lead to *monocultures* (which not only cause ecological damage, but are also unwanted for social reasons – including the perception that they are aesthetically objectionable.) Finally, GMOs are a *threat to intergenerational justice*, since (see above) there are no long-term studies of their consequences and vital residual risks.

## Human-Nature Relationship

In the third field of criticism, fundamental considerations about the appropriate *Relationship between Man and Nature* are put forward. Since this field will become the main topic below, the keywords (indicated in *italics*) will not only be briefly summarized, but also illustrated by remarks and comments.

The genetic modification of plants is described as *unnatural* in a pejorative sense in the position papers: organisms are brought into the world “as it would never be possible in nature” (28/9).<sup>4</sup> “Natural” is highly valued, but genetic modifications are stigmatized as “unnatural” because they do not follow the natural order – an order which is by implication good. The “natural” is therefore the good, the beautiful, the pleasant. It is worth noting that conventionally (that means: non-genetically modified) bred plants are sometimes referred to as “natural plants” (3/5) in the position papers. In particular, the possibility of *overcoming species limits* comes in for harsh criticism. The presence of the genes of “alien organisms” (3/9) in modified plants is said to distinguish genetic engineering from conventional breeding. “Why”, it is asked, “do we introduce the genes of fish into plants? Why should there be foreign gene constructs from genetically modified soy in our milk?” (12/6). The organisms created by the new gene combinations are described as “monster beings” (29/14) with “monster consequences” (29/14). At this point it becomes clear that the brochures are using the term “green genetic engineering” largely as a synonym for the development of transgenic organisms. Cisgenic organisms are not considered in the analyzed texts.

Another central objection is associated with the theme *preservation of creation*. This endeavor is described as “a fundamental Christian mission...[pursued] out of a Christian sense of responsibility” (12/17). In this context, genetic engineering is criticized as an inappropriate disturbance of God’s “plan of creation” (14/20). Again and again, these descriptions are linked to the writer’s own identity: “As a Christian, the preservation of creation is very important to me” (14/17). “We as the Catholic youth do not think it is okay for man to intervene in creation in such a way by manipulating genes” (14/21). However, the term “creation” is not always combined with explicit reference to Christian faith and tradition. Often it stands alone. “Have respect for creation” (19/11), it is demanded; and the fight against genetic engineering is labeled with the slogan “For our creation!” (19/14).

Another term conveying the value of nature is *dignity of nature*. “It is not only human dignity that should be inviolable; other creatures also have dignity” (32/1). Genetic engineering is branded as a violation of this dignity (32/1). Generally, it is seen as a typical sign of *human hubris*. Humans misunderstand and overestimate their position in the world when they

<sup>4</sup> The citation refers to the systematics of the content analysis: The first number stands for the number of the position paper being analyzed; the second refers to the number of the identified argument in this paper.

intervene genetically in the plant genome: “Are we humans [really] so much smarter than creation?” (12/7).

Often in the course of these arguments, nature is understood as good and *fruitful* as it is. Here, too, a natural order, one that is good, is assumed, which man “cannot improve, only destroy” (32/7). However, in this context the fertility of the natural order is emphasized: a further intensification of agriculture is not necessary since nature is fruitful. Nature ensures that the food we eat offer “a balanced nutrition without genetic engineering” (21/7). There is “no reason to use uncertain agro-genetic engineering. We have enough fertile soils” (32/2).

In many places, nature is described as *fragile*, threatened by the technical interventions of man. Genetically modified plants “destroy [the] ecological balance” (13/3). This shows an understanding of nature in which the natural order is not robust and resistant enough to withstand certain technical interventions in the long term. Nature is, on the contrary, represented as something endangered, at least in view of the technical potential in human hands. In this connection – and one could ask whether this is a contradiction – the position papers also refer to *nature’s revenge* as a possibility. Exploited nature will at some point strike back: “Nature is already oppressed enough and if this does not end soon, we and our children will suffer bitterly” (32/3). The “Tower of Babylon will collapse. Nature strikes back mercilessly” (32/9).

Finally, in the field of human-nature-relationship the *scientific approach is seen critically*: according to their critics, the natural scientists who are working with genetic engineering still imagine the plant genome and the associated possibilities of modification as too simple: the “scientific model on which genetic engineering is based is now outdated. The approach according to which the genome is a kind of Lego construction kit into which new genes can be inserted as desired is replaced by the certainty that the DNA functions are a highly complex network” (23/10). The recurrent critique in which nature is understood as a mere “Lego construction kit” (29/4) expresses the idea of an inappropriate objectification of nature, driven by the natural sciences.

## Discussion

### Risks and Social Aspects

Since the paper focuses on the controversy as a place where normative concepts of nature are debated and become visible, the fields *Risks* and *Social Aspects* will be discussed very briefly, only suggesting interpretations that demand a deeper examination.

The first field of criticism, *Risks*, is hardly surprising: it is obvious that criticism of a specific technology will address the damage this technique can do. In regard to green genetic engineering, the protest addresses not only risks to human health but also environmental hazards. With regard to the second field of criticism, *Social Aspects*, it becomes clear that the protest is not only discussing the social *consequences* of introducing green genetic engineering (e.g. how does genetic engineering affect the situation of farmers in Germany or other regions of the world?), but rather other general, socially relevant issues are also addressed. At least four such issues can be identified on the basis of the content analysis.

- (a) Within the genetic engineering protest, questions about the adequate handling of our lack of knowledge are raised. Lack of knowledge is conceived in the brochures not only as

“not-yet-knowing”, or “specified ignorance” (cf. Merton 1987, 10), but also – and more importantly – as an “independent... lasting social and scientific phenomenon” (Wehling 2001, 471). So, one of the implicit key questions in the analyzed position papers could be described as: “How should we deal with the fact that residual risks can never be excluded?” The answer given in the brochures is clear and can be interpreted in the tradition of Jonas’ “heuristics of fear” (see Jonas 1984, 31): when in doubt, listen to the worse prognosis.

- (b) A second general, and socially relevant, issue addressed in the GMO protest is the role of (mis)trust in modern society (cf. general thoughts on this subject Luhmann 2000). The brochures articulate considerable mistrust about actors with power and responsibility – namely, political players and specific scientists – and indeed about the political and scientific process itself. In regard to politics, the mistrust can be subdivided as follows: first, the GMO protest, as it appears in the position papers, urges us to see that politicians, political institutions and decision-making processes no longer have the clout to assert themselves against the influence of global business enterprises. The complaint is that even if politicians want to fight against green genetic engineering, it is nearly impossible for them to do so in times of powerful business companies. Second, political actors are accused of being too closely involved and intertwined with industry. As a result, they are bound to favor the interests of large companies without listening to the majority of the population (which is contrary to green genetic engineering, according to the position papers). At this point, the GMO protest can be seen in the light of the so called “disenchantment with politics”, that is characterized among other things by decreasing trust in the morality and assertiveness of the political sphere (see Arzheimer 2002).

Where the scientists working in the field of green genetic engineering are concerned, the distrust is similar. The brochures claim that there are structural interdependencies between research findings and their industrial exploitation. The results of specific studies showing the positive effects of green genetic engineering are questioned, since research – so the suspicion goes – is dependent on the support of large corporations. Thus, contrary to the ideal of scientific freedom, it cannot be called free and objective. The protest against green genetic engineering can be cited as an example: science generally is less and less perceived as an “authority of pure knowledge production which is outside society” (TAB 2004, 9) and looked upon increasingly as an activity which is interdependent with other societal actors and institutions. However, natural sciences are not only criticized by problematizing the interweaving of research and economy, furthermore also the scientific perspective on nature itself is seen as problematic, asking to what extent this specific view of nature has contributed to the ecological crisis (see 3.2.3 d).

Generally, the controversy can be understood as a dispute that addresses key political questions like procedures, decision-making processes and the inclusion and exclusion of specific stakeholders (see also Dietz and Engels 2014, 74). Who is heard in discourses on the question in which world we want to live in tomorrow? And who is neglected when, for instance, it comes to forms of appropriation of nature and appropriate definitions of nature? (see Beck 2010 and also 3.2.3 d).

- (c) The protest also negotiates the general relationship between the political sphere and the economy, and thus the question of adequate regulation of markets. A lot would have to be said about this issue since it not only touches the understanding of capitalism, but also of

modernity in general. For this reason, Ulrich Beck calls the stance on modernity and economic growth the “Gretchenfrage” (Beck 2010, 262), the key question of our time in regard to environmental issues: “Does modernity stand for sin against nature? Or does it stand for the courage to invent and pioneer an alternative modernity?” (ibid.) One could argue that this question is also discussed in the controversy on green genetic engineering. In the context of the study, the brochures articulate a fundamental unease about tendencies and effects attributed to the capitalist economic order. Even if the analyzed brochures don’t quote Beck, their position is similar to his when he writes: “The victories of modern capitalism produce, unseen and unwanted, the global crises of climate change, its combined natural-social, unequally distributed catastrophic consequences for all of humanity.” (Beck 2010, 256) More precisely, the position papers talk about the influence of companies on political processes, market concentrations, monopolies, referring to strong dependencies and even the substantial curtailment of personal autonomy. The protest characterizes green genetic engineering as a symbol of an economic system in which everything is subordinated to the pursuit and maximization of profit, and in which society and nature are increasingly economized and exploited (see also Busch et al. 2002, 13).

- (d) Finally, the protest raises the question of what form of agriculture society actually wants. This protest must be understood in the historical context of the past century. For decades, the negative side-effects of so-called “industrial” agriculture, which aims for maximum output, have increasingly come to the fore (e.g. see Haber 2014, 111 ff.). The use of pesticides and mineral fertilizers, soil erosion, the loss of agricultural biodiversity, the salinization of soils and even the contamination of groundwater have been – and still are – strongly criticized as deplorable consequences of this form of agriculture. In the position papers, green genetic engineering is presented and criticized as the spearhead and catalyst of a process transforming “rural” agriculture into an industrial system under capitalist logic.

## Normative Concepts of Nature in the GMO Protest

As has been shown, the protest repeatedly deploys the term “nature” (and similar terms) in different contexts. Therefore, the GMO protest can be understood as a place where concepts of nature are being debated and become visible. This should be borne in mind in the following.

### Common Interpretations

The current article is not the first to identify concepts and models of the human-nature relationship as a vital backdrop to the German GMO controversy. The Second Genetic Engineering Report of the Berlin-Brandenburg Academy of Sciences noted that the social assessment of green genetic engineering in Germany is essentially “carried out against the background of broad images of the world and the nature” (Müller-Röber et al. 2009, 407). More precisely, the report diagnoses (see 390 ff.) that within the controversy the question whether or not non-human life must be accorded an intrinsic moral value is negotiated. According to the report, *anthropocentric* and *non-anthropocentric* concepts clash in the debate. Moreover, two further diverging concepts of nature are revealed, says the report: On the one hand, nature can be understood as something that must be protected and preserved: the

report refers here to a *bio-conservative* concept of nature. On the other hand, however, “nature” can also be understood as something that can, or even must, be optimized and changed: the report names this concept *bio-liberal*. After all, according to the report, the idea that there is a difference between *natural* and *unnatural/artificial* – as normatively used in everyday language – is a decisive assumption of the entire controversy: Do someone attribute high moral value to *naturalness*, especially in comparison to the artificial sphere – or not? Similar interpretations of the role of specific concepts of nature in the genetic engineering debate (*anthropocentric* vs. *non-anthropocentric*; *bio-conservative* vs. *bio-liberal*; *high moral valuation of naturalness* vs. *little or no moral valuation of naturalness*) can be found, for example, in Gregorowius (2013), Irrgang (2005) and Knoepffler et al. (2013). Sawicka (2008) – following the work of Douglas and Wildavsky (1993) – argues for a different interpretation: according to Sawicka, the controversy is characterized by different concepts of nature which focus on its fragility or robustness.

All of the named authors assume that the concepts just sketched are crucially important if we are to understand the different judgements about green genetic engineering. To put it simply: according to the interpretations indicated above, opponents of green genetic engineering have, for example, a greater tendency to employ non-anthropocentric concepts, whereas its proponents tend to use anthropocentric conceptions; opponents prefer to understand nature as something that must be protected, and proponents, by contrast, see nature as an entity that should be optimized, and so on.

## Concepts of Nature

The common interpretations set out above raise at least three questions: (a) What is “nature” anyway? (b) What are we to understand by “concepts of nature”? And finally, (c) are the concepts being pressed into service plausible and sufficient given that they provide a vital backdrop to the controversy? This last question will be addressed in 3.2.3 and 3.2.4.

Turning first to (a), talk about “nature” saddles us with the difficulty of dealing with one of the key terms in the history of philosophy (see Mittelstraß 1991, 37), a term which is rich in tradition but at the same time extremely abstract (see Schäfer 1998, 728). With regard to the position papers, it can be said that “nature” is located largely within an Aristotelian tradition (cf. *Metaphysics* V 4, 1014 b 17): the term, as it is used in that tradition, stands for things/beings which grow and develop independently and differ in this respect from man-made artifacts, which are based on the idea, and actions, of an external source. The dense interweaving of “nature” and “technology”, a vital characteristic of our time (cf. Latour 2008, 19), is not addressed at all in the identified arguments. On the contrary, the term “nature” is still treated as an (ideal-typical, pristine) opposite of technology/society/culture, rating all that is “grown” higher than all that is “made”. A perspective which was by the way a key characteristic of romanticism (see Zimmermann 1982, 130).

Where (b) is concerned, the studies quoted above do not elaborate the term “concept of nature” in detail. Against this background, this paper suggests in recourse to the existing literature the following short definition: “Concepts of nature” can be understood as (aa) pictures, ideas and interpretations that people make of nature and the relationship between it and man; these concepts (bb) build on a society’s cultural repertoire and (cc) are therefore historically-culturally variable; they should be understood as (dd) ideal-typical ideas that are (ee) not individual, (ff) manifold and (gg) normative. Last but not least, they serve (hh) the overall aim to cope with reality. Every point will be briefly explained.

Ad (aa): Concepts of nature can be understood as pictures, ideas and interpretations that people make of nature and the relationship between it and man (see Van den Daele 1992, 526). So “Nature is both a concept and all those physical things to which the concept refers.” (Castree 2001, 5) As Hampe states, “the nature” is empirically not accessible (Hampe 2011, 229). Therefore, wherever we talk about „nature“ as it is, it is appropriate to keep in mind that we are dealing with specific concepts of it. Schäfer emphasizes that such concepts are attempts to think of “nature in its totality” (Schäfer 1996, 200).

Ad (bb): These concepts build on a society’s cultural repertoire. That means, ideas and concepts that are vital in a society, for example specific convictions on gods, justice or a good life, influence also concepts of nature. In other words: Concepts of nature are not just images of nature as it is (see Eisel 2004, 92).

Ad (cc): Historical and intercultural studies show that these concepts are historically-culturally variable (see Schäfer and Ströker 1993, 10): What is understood as “nature” – or “wilderness”, “natural”, etc. – is subject to permanent change.

Ad (dd): Concepts of nature can be understood as ideal-typical reconstructions, which arise through an abstraction from empirical characteristics. Ideal types bring tendencies of the empirical material to the point in order to deal with the diversity of empirical phenomena (see Weber 1968, 191).

Ad (ee): Understanding concepts of nature as “not individual” means that these concepts are shared in specific groups as social symbolizations of the relationship between man and nature (see Barkmann et al. 2005, 16 f.)

Ad (ff): Understanding concepts of nature as manifold means that these conceptions occur in potentially contradictory plurality. It is precisely this plurality that demands ethical reflection (see Engels 1999, 12).

Ad (gg): Concepts of nature are often normative – as, for example, White (1967) once discussed in a pioneering article about Christian concepts of nature and their impact on the modern era. In other words, these concepts do not represent pure descriptions. They are instead appellative and indicate “consequences for action and guidelines for practical reason” (Schäfer 1996, 200). They can be described as predispositions to make certain decisions and perform certain actions, accentuating – without fully determining – our perceptions and ways of thinking (see Zwick 1998, 7). In that respect, they have a tendency to isolate themselves from empirical falsification – which makes them a vital backdrop to the controversy, and one that helps to explain, in particular, its intransigence.

Ad (hh): Finally, the paper suggests that concepts of nature are designed in order to cope with reality. As Van den Daele states: People need interpretations of the world around them in order to make sense of their existence and do deal with it (see Van den Daele 1992, 535). In other words, what Habermas says about “Weltanschauungen” also makes sense when it comes to concepts of nature: They serve as an orientation in our life as a whole (see Habermas 2011, 63).

## Perspectives on Nature

The analysis of the German GMO protest thus reveals specific concepts of nature and assumptions about the appropriate relationship between man and nature. The content analysis presented here shows that the concepts of nature mobilized in the German GMO protest are more diffuse and complex than common interpretations suggest.

In order to discuss these diverse concepts at a meta-level, it is helpful to structure them by assuming different *perspectives* on nature. This approach not only emerges from the results of the content analysis; it is also based on previous work. For Honnefelder, for example, “nature” is determined in particular by the relationship we have with it: “Nature only shows itself as nature when we have a certain relationship with it” (Honnefelder 2011, 1574). Aldo Leopold, an important ancestor in environmental ethics, distinguishes different ways in which man encounters nature (see Leopold 1992, 118 ff.). Similarly, Schiemann argues that the diversity of ideas about nature can only be adequately countered by dividing them into specific “worlds of experience” [in German *Erfahrungswelten*] (see Schiemann 2009, 155). For Schiemann, *worlds of experience* are determined by characteristic “processes of knowledge production and forms of proven possession of sorted and orientation-creating contents” (Schiemann 2009, 159). So, what perspectives can be found in the identified concepts of nature?

At the latest since the epistemological debates of the past century, it is known that every interpretation runs the risk of analyzing what it already knows. The study cannot overcome this problem; however, it is tackling it by trying to derive specific perspectives from the analyzed material itself. The subcategories in the field “Human-nature relationship” (see 2.1.3) can be compressed into the following specific perspectives on nature: the usage of the terms *unnatural* and *dignity of nature* as well as the criticism of *overstepping species limits* can be labelled as an **environmental-ethical** perspective on nature. The theme of *preservation of creation* and the way *human hubris* is criticized can be placed within a **religious** dimension in the human-nature relationship. The argument that nature is *fruitful* as it is represents a **practical/agricultural** perspective. Arguments criticizing the *scientific approach* are located within a **scientific** perspective on nature. Every perspective – and all of the accompanying concepts – can now be sketched briefly in order to supplement the common interpretations mentioned above. Finally, the understanding of nature as *fragile* as well as images of *nature’s revenge* give expression to a dimension which can be described as **existential** since it inquiries into the balance of power between man and nature.

- (a) Within the **environmental-ethical** perspective on nature, the GMO controversy can indeed be seen as a societal debate about the range and scope of the moral community. The question whose interests must be considered in ethical reflections is the core question of environmental ethics (see Frankena 1997, 274). Following Krebs’ distinction (Krebs 1997) between anthropocentric vs. non-anthropocentric positions, the identified arguments can be allocated under latter category, more precisely the references to nature show above all elements of a “reverence for life”-argumentation (Krebs 1997, 355ff. or rather Schweitzer 1974). In other words, the brochures take up terms that can be interpreted biocentrically (compare for example the biocentric position of Taylor 1997 or the debate on a dignity of plants by EKAH 2008), insisting on the argument that beings who are incapable of reasoning and/or suffering can still have intrinsic moral value. This argument can only be fully understood if it is seen as response to the opposite, so called anthropocentric position that understands “rational” beings as the only members of the moral community (Krebs 1997, 342ff.). The opponents of green genetic engineering accuse its proponents of working with such a merely instrumental and thus deficient understanding of nature in the moral perspective. It’s important to repeat that the brochures take up terms that can be *interpreted* biocentrically, that means: When terms like “dignity” (of plants) (German: “Würde”) are used in the position papers, the usage does not include a developed non-anthropocentric argumentation, arguing for example

why plants have dignity, rather such terms are used to articulate fundamental moral convictions that seem to not require deeper explanation.

- (b) The position papers contain concepts of nature with a **religious** connotation. On one interpretation of it, it could be argued that the German GMO protest stands in the tradition of Christian heritage. However, another thesis would be that the GMO controversy shows the extent to which the term “creation” has become detached from any theological context and now, increasingly, appears in ecological discourses where it is used to express an intensity of appreciation of nature which is seen as both “good” and “threatened” at the same time (see Schmid 2012, 5). In the brochures, the terms “nature” and “creation” are often used as a kind of moral demarcation, like a “stop sign”. Where this occurs, the terms are located far away from the Christian interpretation of “creation” (see Huppenbauer 2000, 77 ff.). Their usage rather reminds us of mechanisms of religious *tabooing* (cf. Rentsch 2004, 577).
- (c) In the **practical** dimension, nature is seen in the context of agriculture: man is dependent for his survival on an exchange with nature, and he must gain his food from working “in”, “with” and/or “against” nature. As has been shown, the green genetic engineering critique exhibits an idea of nature emphasizing its fruitfulness. Within the history of Western ideas, this concept can be interpreted in the tradition of *oeconomia naturae*, according to which nature is good, harmonious and optimally equipped for the benefit of man (see Groh 2003, 17 ff.). But in the history of ideas there is also a contrasting interpretation: nature as *natura lapsa* (ibid.), which focuses on the barrenness of nature. This second interpretation emphasizes that nature can be repellent, inhospitable, and even hostile. Both concepts involve predispositions to action and judgment which affect, in particular, the assessment of agricultural practices. As a thesis, one could argue that the German GMO protest is an example of the extent to which any notion of *natura lapsa* has lost social significance in the present day. In other words: the term “nature”, in the practical dimension, is usually associated with a fruitful garden – not a sparse field overgrown with thistles. However, concepts close to *natura lapsa* can be found in some arguments presented by proponents of green genetic engineering – e.g. those which stress that climate change leads to a dramatic decline in nature’s richness in an agricultural context (e.g. see DFG 2011).
- (d) The GMO protest also problematizes **scientific** thinking. In regard to environmental issues, modern science is regarded as problematic since it produces a kind of knowledge that allows – to say it with the words of Castree – “ameliorating environmental problems without ever addressing the deeper causes responsible for those problems in the first place.” (Castree 2001, 3) This kind of “technocratic knowledge” (Castree 2001, 4) is “unable to treat nature as anything other than a ‘resource’ to be used, destroyed, or regulated for mainly human benefit.” (ibid.) Natural sciences are no longer understood – as it has been in the “Bacon-Project” (see Schäfer 1999) – as a solution to all problems; rather, the question is to what extent their specific view of nature has contributed to the ecological crisis (see Kessler 1996, 7) This way in which science is grasped in the GMO protest is influenced by modern tradition (see Kolmer 2011, 1561ff.): In the modern interpretation of nature, teleology loses its significance with regard to the explanation of nature. Humans understand themselves more and more as *maîtres et possesseurs de la nature* (Descartes), since nature is degraded to mere matter, that can and should be processed. At the same time, arguments as identified in the study can be seen in the light of a specific criticism of science that can be summed up under the heading of a romantic

tradition (see Sieferle 1984, 44): These arguments are accusing the sciences of having a reductionist view of nature. The scientific dimension is thereby set in competition with “non-scientific” references, whether those are religious, lyrical, mythical, poetic, etc., in order to point to the “list of losses” and “blind spots” within the scientific approach. In regard to concepts of nature, the debate on green genetic engineering stands in the tradition of the dispute that negotiates the potential and limits of the scientific perspective. The critique of the inadequacy of the scientific method and the accompanying accusation of a “desensualization” of man-nature-relationship as well as an objectification of nature play an essential role in the protest.

- (e) Finally, the interpretation of the identified concepts of nature unveils a perspective which can be properly described as **existential** since it is about the balance of power between man and nature, and more precisely about different ideas about the regenerative and compensatory capacities of natural systems in the face of technical interventions. Within the GMO protest concepts appear which stress the fragility and vulnerability of nature. Was “Nature” in former times associated with horror and a feeling of turmoil (see Williams 1997, 30), with something so robust that man hardly could do no harm to it (see Jonas 1984, 20), the term is now linked with the idea of an entity which can be brought out of balance by any small action and is capable of being lastingly destroyed. Schäfer sees the concept of nature as something that needs protection as the most dominant understanding of nature today (see Schäfer 1996, 200), a concept which makes any positive narration of technical transformations – think about green genetic engineering – rather difficult (cf. Latour 2010, 78).

The concepts within the controversy are therefore more diverse than prominent breakdowns of it (along anthropocentric vs. non-anthropocentric conceptions, bio-conservative vs. bio-liberal perspectives, high vs. low appreciation of “the natural”) suggest. In view of the conceptions identified in the content analysis, the study suggests two paths of interpretation. On the one hand, (a) the controversy is taking place against the background of a conflict between *divergent concepts of nature within certain perspectives* on the relationship between man and nature. In a practical perspective, for example, contradictory concepts of the fruitfulness of nature clash (nature as fertile garden vs. nature as barren field). On the other hand, (b) there is also a *clash of different perspectives* in general. In the practical perspective, for example, nature is seen as a resource shaped by human objectives, while the moral dimension asks us to overcome the resource perspective. In the scientific dimension, to give another example, nature is seen as something that follows specific laws which can be understood empirically and systematically. Other perspectives, like the religious one, point out, that “nature” is more than what can be quantified. Only the consideration of both interpretative paths – (a) *and* (b) – seems to offer an adequate understanding of the controversy as a prominent place of divergent normative concepts of nature.

## Outlook on the Future Debate

The search for an improved understanding of the GMO protest is followed by the question: To what extent can the findings here be related to the current and future debate about the so-called *New Breeding Techniques*? Just to be clear: The aim is not to weaken any possible protest. Since many opponents and proponents agree that the GMO controversy was emotional and

characterized by mutual disrespect, the question arises if another, that means *better* culture of discussion is possible and if so, how. To put it into the context of this article: If different concepts of nature are indeed an essential (often implicit) backdrop to the controversy about biotechnology in agriculture, how should these concepts be dealt with?

At least three answers are possible: (a) A first response is to make a *strategic* calculation: Which ideas of nature should be encouraged in order to strengthen one's own position? Such a strategic approach lies within the broad field of public relations or marketing. It is not the task of ethics and can safely be set to aside. (b) In the sense of a preliminary work of descriptive for *normative* ethics, a second approach would be to critically examine the identified concepts: To what extent are certain ideas plausible, consistent and adequate in view of current challenges? (c) Finally, in line of the *descriptive* approach adopted here, the identified concepts (along with other elements in backdrop to the controversy like those shown under 2) could be made more visible by putting them in a discussion intended to make the fundamental divergences, and also the similarities, between opponents and proponents more transparent.

This third approach could be followed within a framework of conflict management instruments, and in particular participatory models which explicitly involve not only experts but also laypersons in the discussion of technology and its implementation (see Van den Daele et al. 1996, 3 ff.). Think of *stakeholder workshops* that aim to “involve different social interest groups” (Zimmer 2009, 39) with the aim of “resolving blockages in the political process” (ibid.); *mediations* as “reactive participation processes” (ibid.) which are used “when conflicts have processed and escalated” (ibid.); *scenario workshops*, a method that “tries to involve relevant actors on a certain topic... in the development of ideas and planning processes” (ibid.) regarding the future; or *citizens' conferences*, whose goal is “to define problems, positions and opinions with regard to a controversial scientific field – from the citizens' point of view” (Kailer and Naumann 2009, 141). In all these methods it makes sense to not only address questions about possible risks and benefits of a specific technology, but also leave room for questions about the two fields here identified: *Social Aspects* and *Human-nature relationship*.

However, the present article argues that conflict management instruments are not the only place where vital backdrops to the controversy can be and should be made visible. Another place is in educational processes. Gebhard notes in a different context, but in an analogous form of argument, that certain imaginative worlds, ideas and pictures influence specific debates, especially on technology. He contends that these ideas should be made “repeatedly the subject of explicit reflection” (Gebhard 2017, 191) since educational processes will be more meaningful and efficient as a result – especially in comparison to formats that ignore such ideas (ibid.).

The following example illustrates how this approach could be implemented in practice in the field of plant breeding. The author of this article has been significantly involved in the conception and realization of the website [www.Pflanzen-Forschung-Ethik.de](http://www.Pflanzen-Forschung-Ethik.de) for more than five years.<sup>5</sup> This site is an attempt to establish an information platform on modern plant research and its contexts. It puts the scientific and technical side of modern plant breeding into the context of ethical considerations. In this way, it explicitly names vital aspects of the backdrop to the controversy (such as “What kind of agriculture do we want?” and “How should we deal with the fact that

<sup>5</sup> The web portal was made possible by the Bavarian State Ministry of Science, Research and Arts within the framework of the project “Exploration of the communicative potential of a web portal to promote ethical discussion about plant research”, which was carried out by the Institute TTN at LMU Munich in cooperation with the Chair of Practical Theology at the LMU Munich (Prof. Dr. Christian Albrecht). Further cooperation partners in the project were the agency i-bio-information, Aachen, and the University of Philosophy Munich (Hochschule für Philosophie München).

residual risks can never be excluded?") and puts them on the radar screen of public debate. Additionally, at <http://ethikrat.pflanzen-forschung-ethik.de> users have the option of working with the so-called "Online Ethics Council", developed as an essential part of the portal. They can put themselves in the role of an ethics council which has to develop an ethical assessment on a certain question in the context of modern plant research. Thus, the Online Ethics Council is an interactive tool designed to promote independent ethical judgement on concrete plant breeding scenarios. As a first step, the user chooses the scenario he wishes to discuss (e.g. "Should Germany promote the development of vitamin-enriched cassava for developing countries?"). Access to brief information about the relevant factors (such as Which breeding technology can be used? Why is vitamin enrichment a target of plant breeding?) is available. In a second step, the user is invited to spontaneously judge the scenario by writing down what he thinks about it and which associations come into his mind. In the ensuing, third step, the tool presents specific statements (relevant to the scenario) and asks the user to agree or disagree with them. In doing so, the user encounters questions about different concepts of nature – and he is confronted with the question to what extent these concepts should be considered in his assessment of the scenario, if at all. The Online Ethics Council does not, therefore, provide an answer to the question whether concepts of nature should play a role in decision-making on scenarios involving the genetic modification of crops. Nor does it provide preconceived answers about which ideas of nature are more appropriate, and which are more suitable, or applicable, than others. Instead, it sets users an issue and invites them to explicitly reflect on it. While the user is indicating his agreement or disagreement with the statements, the tool transforms his data into a text which becomes the final report of the Ethics Council. The tool can be used by individuals, however, aiming at a greater transparency to the fundamental divergences and similarities among critics and proponents, its usage within group discussions is recommended. Furthermore, every user has the possibility to put his final report online, so that other users can read and comment them. The portal, and in particular the Online Ethics Council, can be understood as a tentative attempt to explore the extent to which the description of the GMO protest – including vital backdrop elements like different concepts of nature in all their diversity – can be made fruitful for current, and also potential future, controversies about plant breeding technologies.

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