Exploring the non-empirical underpinnings of gene-editing:
An ethical analysis of the naturalness of gene-edited rice in Japan

Candidate: Hannah Marie Hernandez

Bioethics / BIO 340

Norwegian University of Life Sciences

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1. Introduction

Current patterns of consumption for many of today's societies are unsustainable, however, the push more sustainable lifestyles means that many aspects of everyday life will change and this may put at risk some of the parts of life that are deeply valued by people. In orchestrating this change, governments are forced to prioritise some values, while leaving others behind. Being aware of which values may be minimized in the name of 'innovating' for or 'transitioning' to sustainability may allow decision-makers to reflect on such trade-offs and to develop a more holistic understanding of the consequences or side effects of their innovation trajectories.

In particular, innovations in food biotechnology such as through gene-editing and the CRISPR tool present one such forum for debate and discussion, as trade-offs and tensions are becoming increasingly evident. Exploring the non-empirical underpinnings of modern biotechnology processes and products may help decision-makers to understand with greater empathy why resistance occurs among certain groups, as well as what they stand to lose when such technologies progress forward. For this analysis, I use a case study of gene-edited rice in Japan, to explore this further and to conduct an ethical analysis with the aim of providing insight into the non-empirical perspectives of gene-editing as natural or artificial.

2. Ethical Framework

To begin, I use descriptive ethics in this analysis, which argues that a moral problem must not be assessed only through a general ethical framework, but must also be considered through its specific context, such as its historical backdrop and cultural traditions (Dürnberger, 2019:50). This is relevant because concepts of nature are cultural, in that "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" (Dürnberger, 2019:57-58).

Discussions of gene-modification and gene-editing represent a unique forum where various concepts of nature are being debated and are becoming increasingly visible (Dürnberger, 2019:56). One problem with this, is that nature (and naturalness) is one of the most complex words in many languages (Kirby, 2011). As scholarship elsewhere has been dedicated to examining this in further detail and trying to define it (see Reiss and Straughan, 1996; Lie, 2016), for this analysis, I will simply examine some of the possible perspectives on nature and the underlying philosophies.

It is understood that from a purely ethical perspective, naturalness as a framing of a subject is itself is neither good or bad (Lie, 2016). In other words, being natural does not

inherently have ethical relevance or an intrinsic ethical value (Reiss and Straughan, 1996), nor does it necessarily prescribe normative action (Lie, 2016). This is at least in part due to the 'naturalistic fallacy' in which one prescribes what *ought* to be from what *is*. In this case, "simply because something happens in nature does not mean that it is right or good, that is should be preserved or protected" (Reiss and Straughan, 1996:63). Furthermore, in an extrinsic perspective, the concerns around nature relate primarily to consequences, which often take the form of risk and safety considerations involving technical assessments of probability.

However, given that many people hold some form of value for nature, there are perhaps deeper moral understanding that must be considered: such as respect. Respect can demonstrate an intrinsic value for nature: that nature is valuable in itself (Reiss and Straughan, 1996). German philosopher Immanuel Kant argued that demonstrating respect meant treating the subject as an end in itself, not only as a means. However, treating a subject instrumentally is not necessarily incompatible with showing it respect; and using it's ends as your own may be ethically acceptable, whereas disregarding it's ends entirely is not (Reiss and Straughan, 1996). This is demonstrated in numerous ways through our complex relationships with animals, such why it is possible to raise livestock for our consumption whilst still respecting them.

I would take this argument even further. The above viewpoint leans very heavily on a Western view of nature, an often disconnected one in which people and societies are seen as separate from nature (Reiss and Straughan, 1996). Here nature is largely valued through an instrumental view (such as a commodity) and sometimes through an intrinsic view by those who hold other (e.g. spiritual) values nature. However, many other cultures have a more interconnected view of nature, where culture thus comes to represent a contextual factor that may in fact produce ethically relevant reasons to treat natural and unnatural framings of subjects differently. In a deeper sense, the distinction between culture/nature can even be challenged, although that is beyond the scope of this analysis.

In particular, I would argue that in Kant's demonstrating of respect to nature, this in fact still represent how one 'ought to' behave towards the natural world; it describes what a desirable *relationship* with nature *ought* to be (Chan et al. 2016). This idea of value derived from a relationship is interesting because there is a notable lack of relational perspectives and relational values of nature analysed through ethical theories (de Graeff, et al. 2019) despite the apparent contradiction with the naturalistic fallacy, making it relevant to explore further.

For this analysis, relational values regarding nature refer to: "the importance attributed to meaningful relations and responsibilities between humans and between humans and nature" (Arias-Arevalo, 2017:9). What is being valued is the context-specific relationship, and thus this

relationship to the subject is what is meaningful and unique: the subject itself can be commodified but the experience of the relationship remains singular. Examples of relational values could be spiritual relations and experiences, or places that are sacred, produce aesthetic enjoyment or meaning, or generate inspiration. In this way, the value of nature is not truly independent of humans (e.g. not intrinsic), but is also not only a means or utility to humans (e.g. not instrumental), as has been critiqued (see Baard, 2019):

> "Relational values also apply to interactions with nature. Some people's identities are rooted in long-term care and […] [s]ome people and social organizations hold worldviews that encompass kinship between people and nature, including many indigenous and rural societies […]. Many people believe that their cultural identity and well-being derive from their relationships with human and nonhuman beings, mediated by particular places […]. Caring for and attending to places can be essential for perpetuating cultural practices and core values" (Chan et al. 2016:1463).

It is thus clear that to assess the underpinning ethical relevance it may be useful to consider the relational value of nature (and indeed the relationships with intrinsic and instrumental aspects of it), as embedded in context and culture.

3. Discussion

3.1. Case Study

Relational notions of value are prominent in Eastern philosophies (Chan et al. 2016), and among other places, the relational value of nature is evident in Japan. This is described by the Japanese philosopher Watsuji Tetsurô (1889-1960) in that the Japanese people are interconnected with Japanese nature and are product of this interconnectedness (Walker, 2015). It is thus not an untouched nature as is found in many Western views that is valued, but rather a relationship that involves human beings in some way. The "Japanese love of nature, as well as the Japanese idea of Japanese love of nature, revolves partly around nostalgia for what are considered traditional relations with nature" (Kirby, 2011:69). The countryside is even said to host the "endangered soul of modern Japan" (Goto-Jones, 2009:148). Since this value is rooted in an ideal relationship, the reality that many Japanese now live in urban areas removed from nature and thus lack a physical relationship with nature does not reduce this cultural value.

Rice in particular holds a special relational importance to the Japanese through cosmology and identity. In *Rice as Self* (1994), the Japanese anthropologist Emiko Ohnuki-Tierney explains that, "in Japanese culture [it] is the rice paddies that stand for agriculture, the countryside, and the past- all symbolizing nature with its soil and water and, ultimately, the Japanese nation and its people" (Ohnuki-Tierney, 1994:120). Therefore, it is not an untouched

or pristine nature that is desired, but rather through cultivated land and a historical and spiritual relationship with the land that the value of nature is evident.

In fact, though rice has been cultivated in Japan for centuries, both traditional practices such as conventional breeding as well as continually changing practices like the adoption of agricultural technologies, the relational value of nature has been upheld and respected (as has been demonstrated elsewhere too, see Dürnberger, 2019). However, with modern genetic engineering technology like CRISPR, the understandings of nature and of naturalness are being increasingly challenged. In fact, the distinction of 'natural' determines whether or not rice produced by gene-editing via CRISPR will be regulated under the Japanese Food Sanitation Law (and thus subject to additional safety screenings and the required labelling) (Ishii, 2019), which has led to tensions around the technology.

There are two key arguments for this specific debate. First, it can be argued that gene-editing represented the same, natural changes that occur in the genome with conventional breeding practices (NHK, 2019; Kobayashi, 2019). Conversely, it can be argued that gene-editing causes uncertainties in an unnatural transformation process that are not as apparent as through conventional breeding, such as the occurrence of off-target cutting which edit places in the genome that were not intended (Ishii, 2019). At present, the Japanese government, supported largely by industry and academia, has taken a regulatory approach that has been referred to as 'science-based' (Farid et al. 2020). This means that since no substantial risks in the process or products of gene-editing have been discovered yet, it can be considered 'natural' and thus not subject to gene-modification regulations. While no gene-edited varieties of rice are commercially available, field trials are currently underway (Ishii, 2019; Gigi, 2019).

While the argument of 'natural' appears to have won out, it does face backlash amongst citizens and consumers groups who believe that the process and products of gene-editing are in fact, not natural. This means that new questions arise as to the ability to continue to act ethically and respect nature and uphold the relational values of this context and culture. It is thus relevant to apply ethical analysis to discover this.

3.2. Analysis

First, it appears the moral approach the Japanese government is taking is through a primarily extrinsic perspective. According to Reiss and Straughan (1996), this means making predictions about consequences, which can be accurate or inaccurate. For extrinsic perspectives, since no conclusive proof can be provided beforehand, the probability of occurrence is weighed heavily. This is similarly to in 2009, when the Japanese Food Safety Commission "concluded that the

food safety of cloned cattle and swine is equivalent to that of such animals raised by conventional breeding" (Food Safety Commission of Japan, 2009 in Ishii, 2017:27). The Japanese government is still pursuing a technological approach, now to CRISPR and gene-editing, which continues to focus largely on the factual assessments and opinions of safety experts (Ishii, 2017).

Yet Reiss and Straughan (1996) argue that like safety assessments, this is a technical question that does not automatically answer moral or ethical questions because even extrinsically, consequences are many and far-reaching. It therefore imperative that consequences be weighed against each other through *plural* value assessments and not become a matter of purely factual assessment. Ethical judgements must thus still be made about the value and priority placed upon different costs and benefits, which in the case of plural values, includes those that are not of a monetary nature. This plural valuation would open up for other forms of consequences that can occur, and other types of values that can be put at risk.

For this particular case, the fact that citizens and consumer groups do not all feel that gene-editing is considered a 'natural' process and prioritise the extrinsic value, means that there may be inadvertent consequences. This this could pose social challenges, such as being a threat to traditional food, which is a cultural asset (Dürnberger, 2019:52) especially in Japan, or could threaten cultural values that are based on a relational value with nature. I argue that the ethical relevance for this case of a natural framing is grounded in the cultural meaning, value, and significance of it. This is because the use of CRISPR to genetically edit rice risks moving one further away from the relational value of nature (rooted in cultural, heritage, cosmology, respect, identity, and spirituality, and thus the singularity of the rice), towards a purely instrumental value of nature (rooted in capitalism, neo-liberal, and market interests, and thus rice as purely a commodity). Thus because of the importance to culture and the damage that can occur, in this context it is ethically relevant for us to treat natural and unnatural differently.

3.3. Further Research

While this analysis has explored the underpinnings of naturalness through a relational perspective, important questions remain for this case; Which aspects of the relationship does gene-editing challenge in both the process and the product? What is needed for those involved in the 'value chain' of gene-edited rice to act ethically and respect the relationship, thus not putting at risk the relational values and important identity and cosmological meanings in future rice-production? Ultimately, what form of agricultural and rural relations with nature are desired, both in practice and in concept, as they become increasingly technical?

5. Conclusion

While intrinsic and instrumental values are important ways to understand nature, increasing scholarship is recognising that thinking only in these terms may exclude other fundamental meanings in concepts of nature (Chan et al. 2016). Descriptive ethics, which aims to consider also the context of an ethical dilemma is then essential to this, where it becomes possible to understand the diverging perspectives and values related to nature and debate them (Durenberger, 2019). Relational values, which demonstrate an importance in the relationship between humans and nature have often been absent from the literature and from Western philosophy (Lie, 2016), but by considering them, it may help to produce new ethical perspectives around modern technologies that will surely shape this relationship.

In this analysis, I have aimed to extend this type of analysis to a case study of gene-edited rice in Japan. In this case, the gene-editing of rice has two framings which are at odds: the government, industry, and academia framing of a 'natural' process and product that is the same as conventional breeding; and the citizens and consumer group framing of an 'artificial' process and product that has unknown consequences and should thus be regulated as gene-modified. The science-based nature of the government framing of natural does not lead us to a clear ethical understanding however, and indeed a deeper understanding of consequences is still needed.

When I analyse this position further, ethical relevance becomes evident through cultural significance, due to the potential changes to the cultural values ascribed to the relationship with nature. In this case, genetically editing rice may move one away from this relational value of nature and the singularity of rice, towards an instrumental value of nature, and seeing rice purely as a commodity. This consequence shows that it is indeed ethically relevant to see a distinction between natural and unnatural framings.

The overall aim of this analysis has been to explore some of the non-empirical underpinnings of gene-editing, in an effort to demonstrate that important elements of both nature and biotechnology are in fact not about the scientific aspects at all and whose positions are not based in natural sciences. Instead, essential aspects revolve around the framings, morals, ethics, and interpretations of such concepts and the subsequent consequences of these in the socio-cultural realms of life. Hopefully this has illustrated that pursuing a purely scientific understanding of such concepts as we search for more sustainable innovations, solutions, and pathways to live may have widespread consequences and negative side effects that must be considered and brought forth for open discussion as we progress ever onward.

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