



Bioethics and Plant Biotechnology the example of the GENIUS Program between Science, Agriculture and Sustainability



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Introduction

Agriculture, for millennia, has been the digest of expertise of uses, fruit of relationships maintained by peoples and their communities. Since the advent of agro-genomics, we have privileged the model of experimentation in the laboratory or under its control, depends on the experience of territories, expressions of empirical knowledge (of the selection of varieties to cultivation techniques, to landscapes). Having already in the past transformed the history of agriculture [1], scholarly expertise plays today a new role in the orientation towards our choices of future agricultural techniques, especially at the time of the ecological transition. It competes with the uses, and in the presentation made by certain scientists, often suggests that knowledge uses the line would be straight. Knowledge of the logic of life (biology) would prepare the mastery of life (biotechnology).

Therefore, at a time when ecological issues are weighing more than ever, we need to ask ourselves urgently: if there is indeed a will to control the living through a field of new knowledge of biotechnology, what conception of sustainability can support? More concretely, how is the plant biotechnology laboratory the place of translation of ethical values related to sustainability, from the conception of the living to the design Techniques?

This questioning makes sense in the tense climate generated by this research. That this for reasons of ethics, health or the environment, in civil society, we can notice an explicit animosity towards Genetically Modified Organisms (GMOs), for whom 79% of the French express their concern [2]. The legislative framework remains binding for these techniques, still prohibiting their use in the open field. Even notice of new genome editing techniques, the European Union (EU) carried out this summer a reference for a preliminary ruling on the use of these so-called "genetically edited" organisms [3]. On the side of many international and European scientists feel discredited and rebel differences between

these two techniques do not give rise to separate legislation. "Scientifically, these technologies clearly differ, and they have potentials, completely different possibilities and effects » [4] say his European defenders. When at the same time, although the EU has argued that "the risks associated with these new technologies were comparable to those of so-called traditional GMOs' [5], many citizen representatives are indignant that research into genetic modification of plants, whatever it may be, is always deploys [6], and this private sector investment, but especially thanks to the public funds allocated by the Ministry of Research (National Agency for Research).

The democratic challenge is therefore important and the voice of researchers on this question of society is finally less heard than that of detractors of plant biotechnology. So, what can be said about what is at stake in this sector of French research, at the heart of innovation as controversy? To seek clarification, we were invited to participate in the GENIUS project consortium to carry out an internal study. This ambitious research program for technological improvement in the plant sector, brings together more 70 high-level researchers, deployed at national level and with 21.3 million (including 6 million from the budget "Biotechnology et bioressources" [7]), aiming to gather and generate joint knowledge on plant genetic modification [8].

Its objectives are a priori obvious, its acronym tells us explicitly about its wills. G.E.N.I.U.S [9], in French "Cellular Engineering: Improvement and Innovation technologies for sustainable agriculture plants", demands a societal clearly defined. Plant genome modification techniques are part of in the vast project of realization of a sustainable agriculture. But what does agriculture mean sustainable? Is this a working hypothesis in test phase? A rhetorical maneuver that soon it will be denounced as a communication operation in the service of "growth green"? Is it a real commitment to sustainability a regulatory ideal? How

is lived and conceived this end by the members engaged in this program?

To see more clearly, we imagined that it was essential to be located upstream of the effects of these techniques, asking the following question: what are the representations of the sustainability of these researchers? Attempt to explore understanding of the world that the scientists in charge of advancing knowledge within the technoscience, seems to us unavoidable before addressing the subject of the risks of their techniques. To understand if certain GMOs can serve a sustainable agriculture, passes necessarily by the consideration of what drives researchers, what constrains them, and how they perceive the role of their research in the construction and development of a world common. Because at the interface between science and society, economy and agriculture, the laboratory of biology and agronomy plays as a reference standard for / on / with - this is the whole question - what operates on the territory.

Understand what is being played out in a research group such as GENIUS and allow scientists and companies mobilized to express themselves on their conceptions of agriculture sustainable development and their motivation, is therefore a first step towards a necessary dialogue and the clarification of an ethical controversy still stormy.

Techno-technological neutrality: a foundation for sustainable biotechnology?

Sometimes denigrated or suspected, especially by anti-GMO associations, biologists that we have encountered advocate the idea that they work to produce and make available reliable scientific knowledge, developing technologies rich in perspectives, enabling the realization of informed societal choices. "Our role as a scientist is to advance knowledge. Afterwards, it's up to people to choose what they do with it. We are in democracy. I make available what I know, that is my responsibility as a researcher in the public sector. Then it's up to the company to decide" [10] tells us a researcher from the GENIUS program, a scientist attached to INRA [11]. In this sense, laboratory as described by these actors, does not present itself as a space for translation of social values, but rather as a place of discovery of a language universal, that of validated knowledge, bringing to light the understanding of the living by genetics and its "code". To bring it to light, the technique is seen as an ever-improving tool. Gagging out of caricature postures and radically cleavants of a euphoric techno-fetishism or a techno-phobic romanticism, it is positions as the simple condition of access to the objective understanding of the living. Gold the pitfall here lies in not taking the trouble to think the technique for what it is.

Because as we deepen this topic, philosophers such as Gilbert Simondon [12] we allow to affirm that a technique is not only a set of tools, ethically neutral, whose virtues come from its good use and the defects of misuse. A technique is a living environment, already carrying values and normative choices integrated into its processes. Therefore, plant biotechnology must therefore reflect

on its values and choice in terms of "sustainability" and between green growth and transition agroecological. The fundamental question remains whether the plant.

Biotechnologies serve a sustainable agriculture and if so which?

In fact, it turns out that the project mobilizes skills and wills likely to build a sustainable agriculture, but the concrete implementation of this agriculture in the field is by no means integrated as a direct objective of the project explain many members of the program [13], in that it is not part of their core business.

Thus, the name of GENIUS, is based on a rhetoric of seduction, perfectly conscious, but recognized as essential. It is therefore accepted that the "S" of the heading ("sustainability") falls within the "politically correct" [14] or even "fashionable" [14] rather than the central object of the reflection animating the program. In this context, it must be recognized that it is not the announced societal project of sustainable agriculture that calls for research technoscientific, but a technoscientific and industrial project civil and political adherence. "What they do is so far removed from agriculture. interesting to ask all these people if they know what the acronym GENIUS stands for, carjesuissûr (e) what are three quarts not" [15] explains a scientist. Hence the feeling sometimes expressed by detractors of plant modifications that "these scientists are totally disconnected" [16] formulates an organic farmer consulted on the objectives of this project. So that through the notion of "disconnection", it does not It is hardly a matter of questioning their competences or even of denying the existence of motivations.

sincere and profound researchers behind their technoscientific approaches. In However, she regrets the choice of questions and problems experienced as central. The progression of knowledge seems to many scientists to be a goal in itself, more important in the speeches that cause it serves. The lack of tangible evidence of the conduct of a demanding reflection, individual and collective, on certain issues such as sustainability, engages a fear-that it cannot be condemned as illegitimate-that science is not confined to always conceiving of social issues. Because it is at home both at Limagrain and at the local organic producer, everyone will never stop repeating that they think they are loyal to the virtues of their profession, taking care never to be part of a "radical" approach. "I chose the biological but does not think to be in ideology. I just wait for them to explain and give us something to judge if we adhere to their vision of things. If they prove to me that their technologies are beneficial, I will follow" [16] then says another farmer consulted (e). But for a non-scientist, the evidence cannot be. They can not be understandable unless pedagogically popularized. The proof lies rather in the certainty of objectives with a common purpose.

These facts must not lead to the conclusion that there is no sensitivity or ecological thinking of GENIUS researchers. On the contrary. They claim that they are concerned with environmental issues and are involved in them, particularly in their personal citizen

approaches. So, the notion of sustainability seems spontaneously accepted. Because finally, “sustainability is common sense!” [16] exclaims one (e) scientist. At the same time, the co-construction of a technoscience at the service of sustainability remains a relatively unexplored dimension. “On GENIUS, sustainability was neither the motivation, nor the goal” [17] explains one of the researchers. Professionally and personally, the concept of sustainable is considered very important but “does not have much to see with plant genetics research » [17] because “it’s only a technique” [18] explains a researcher (s) like 3 other confreres. So, do not be mistaken: the idea overwhelmingly shared by GENIUS members behind this remark does not consist of to say that sustainability is not essential, but persists in technical as neutral, only its use can be qualified as sustainable or not.

Serving the Interests of all even if they are not equal? Conflict of Interpretation on the Durability

This is the recurrent pitfall of scientific discourse, because any technique that “takes” does medium, and therefore does not allow itself to be divided between means (supposedly neutral) and ends (supposedly independent of the means) as demonstrated by Bruno Latour [19]. The techniques are not mere transparent intermediaries but mediations that shape our relationships to others, to oneself and to the world [20]. They are constitutive and sensitive to our choices, but not revocable at will. The techniques incorporate scenarios, expectations of their taken on us, on the world and the environments in which they are intended for functionary [21]. The fact that high-level scientists are thinking of producing a neutral knowledge poses an epistemological problem that creates a social mistrust of the use of their expertise. The challenge for the layman is not ultimately to judge whether the Genome modifications are or are not relevant in themselves, but to require from those who respond that they place their expertise within an explicitly formulated framework of values to capture the baggage of representations contained in these proposed techniques.

On their side, potentially capable of everything, according to the Baconian dream of to push back the limits of nature, biotechnologies are presented at GENIUS as one of the levers to meet our agronomic challenges, accompanied by of a different moral differentiation as to the motives at work. This moral in differentiation ultimately leaves everyone free to build his ethical position according to his interests, provided that the health precautions governing these biotechnologies are duly respected. “The limit we have is to respect the regulations and to ensure to the absence of dangerousness”.

On this point, a program scientist is explicit [22]. This system, claiming neutrality as the axiom of reference, serves all interests in default interests of all: those of multinationals such as Bayer-Monsanto or Limagrain who aim at monopolies; those of some development policies fighting against the malnutrition; or those which create, as a preventive measure, plants capable of withstanding the effects of climate change (drought or the consequences of declining biodiversity).

While genetic modification of plants has become the subject of questioning societal, this lack of ethical positioning of GENIUS about ecology in its together (oikos-logos: speech and science on how to inhabit the world), may surprise. Because, finally, we must recognize that they do not offer only genetic knowledge of plants (the “biological truth”), but also the skills for their genetic modification (the “efficiency”). This step is not neutral, it calls for an explanation of the project it serves. To do this, it is necessary to rely on the holders of the responsibility for the production of GMOs and their effects, positive or negative. However, this identification remains complex because biologists in charge of developing models and producing knowledge point invariably a “system”. “Since Neolithic times man has improved (in the sense of the man) the species to eat better, more to his hunger etc. Genetics is one of the ways the continuity of this process “explains a researcher from GENIUS. But as for define the ethical criteria from which to possibly limit this process, it is to the subjectivity of each one that one is sent back. The neoliberal conception of knowledge scientist creates and ensures a legal framework that takes into account certain ethical issues and techniques. For the rest, it leaves free the groups and individuals orientations to take, sometimes making individual liberty prevail over collective freedom because it is more determine.

Biotechnologies and democracy: the challenge of technoscience? “I am totally free in my work. I do not feel any particular pressure as for my research objects. There is a context and a dependence on funding well sure, but that never forced my search personally” [23] recognizes one (e) program scientist. The individual freedom felt is very real [21] but paradoxically, totally conditional on prior adhesion to the collective system. As you go that many new societal challenges weigh, forms an inflation of ethical aspects of each object, attempting to compensate for the phenomenon of interests of some. At the individual level, ethics is thus considered sincerely incarnated. “I have an ethic of course! I would not suggest techniques or plants that I judge dangerous or unsuitable. And I’m sure my colleagues do the same!” [24] formulated a scientist interviewed. It is in this context of multiplication of ethics subjective that plans for “corporate social responsibility” (CSR) are developing, committees of ethics, charters and regulations in all gender and in all instances collective. This phenomenon operates a de-essentialization of ethics, as of morality normative, to replace it with regional and specialized “small ethics” such as the analysis Mark Hunyadi [25], deploring the existence of “ethics everywhere but debates null share” [26].

INRA or CIRAD, members of the GENIUS program, have for example their own ethics committee. This should question us about the capacity of ethics not to lose nature, its function, its meta dimension and its critical dimension. Because this context operates analyzes and actions constrained to think inside the biotech movement, bypassing the big question of the type of society we want to implement. The collaboration of GENIUS with the High Council of Biotechnologies (HCB) on a purely advisory evidence.

This ethical relativism leads scientists to carry a double speech about the activity to which they devote themselves, advocating both the character fantastically innovative biotechnology and the fact that there is “nothing new in these techniques [27]”, and this in the mouth of the same interlocutor (trice). If the scientists of GENIUS identify in this speech the testimony of a multiplicity of angles of analysis possible, guarantor of societal guidelines that are fortunately free and democratic, it is fear that it may also be perceived as an unhelpful absence of clarity in the project of scientific elites.

Sensitive to this antinomy of the discourse, it became civil society to come to seek scholarly expertise without any intention to submit to it as was the case in the last century. The result is a claim to the resolute freedom to be able to criticize it, sometimes even to question it. We are at the heart of problems that science poses when it is prone to disguise itself as morality. By claiming beyond, it tends to become a neutral judgment. Knowledge becoming guardian morality, expertise tends to confiscate the discussion by becoming argumentative authority. Concerns about the development of these sciences are thus informed. Biotechnology acting as a new form of biopower [24], are found willing to circulate between state and support the so-called eutrality of science. So that citizen mistrust without claiming to define the “real” in the field of scientific expertise, participates on the other hand of a form of assumption of legitimacy dominates conference technological sciences, by claiming expertise of use.

For finally, adopting the neo-liberal precepts like other organizations, GENIUS participates in the setting of norms, without being accountable. These “lifestyles” [28] as a global system in which every individual in society evolves, formulates implicit expectations that everyone must comply with, without can identify their origin or their responsibility. Les technoscience thus shape our existence and build a world in which we are expected to know how to do it. What they imply in the organization of our food, our practices agriculture, our care and our landscapes is deeply marked by the absence of democratic consultation. Because contrary to the foundations put forward by actors in this program to legitimize their work, democracy cannot be reduced to right to choose the uses of a technique. It consists in choosing a societal orientation in consciously adhering to the lifestyles it induces. Although participation systems citizens are starting to emerge [29], the cautious welcome of the general public to these biotechnologies show that the direction taken by plant biotechnology is far from being accepted.

The debate on “GMOs” finally comes to crystallize this feeling of dispossession of what it we are allowed to do and think in the liberal system that is ours. Advancing though come forward, although civil society thinks, [30] what is understood as “progress” technological innovation - often confused with innovation - is developing, associating scientific, industrial, financial and political powers, as Jacques Ellul [31]. No truly democratic body can regulate individual choices in favor of a collective definition of the

world we want.

Prônerainsi the freedom individually liberal paradoxically comes to invisible the absence of collective freedoms, hindering individual freedoms (choice, organization of life, consumption, food, relationship to nature etc.) implicitly. The programs of such as GENIUS contribute precisely to establishing this type of living together.

Although often well-intentioned, the standardization of the plants we eat, the ways of supplying our food, or the intrinsic properties and plant cultivation methods that we consume are defined by what the designers and ultimately the owners of these techniques, who cannot claim to be neutral, define between them as possible and desirable.

Conclusion

Biotechnology researchers carry high scientific and techniques. They are also citizens concerned about the type of society in which they participate. Some are invested in the protection of the environment and wonder about the best how to make their knowledge available to everyone. According to the study conducted on their field, these personal values cannot be called into question. But is questioned their articulation, or even conflicting with the ethical basis of the research project within which they are put to the test. This is the manifestation of a “science involved” [32] who is here expected in its triple dimension:

- A. Researchers are often summoned as experts. Perhaps we could sometimes hear them as citizens? Leave room for the expression of their subjectivity would undoubtedly make it possible to deconstruct a posture of neutrality that is not tenable, in addition to being often criticized. This entails the avoidance of possible conflicts biographies of scientists, who usually have to arbitrate between their posture of researcher and citizen.
- B. The project of society they share in common could be explicit, knowing the plurality of values that they go through individually, and finally.
- C. The formalized implementation of a continuous ethical questioning by the scientific community, going beyond their plant modification activity, and carrying on the impact of lifestyles and existence should certainly be engaged.

Behind these reflections is the finality, if not, the legitimacy of the GENIUS project Without being able to justify its actual inscription in a sustainable agriculture, it exposes itself to a disapproval of civil society and a discrediting of its well-founded on the ethical plan.

To this day internally, it is without any animosity that the members of GENIUS do not get along not on the very notion of “sustainability”. Differences in generation between researchers are not moreover, not insignificant on this point 39. They are no more in agreement on the type of world for which they intend to work

thanks to the knowledge they produce. If the diversity of opinions within the project must reassure us (because it demonstrates the non-linear character and not standardization of possible uses), we must nevertheless ask ourselves: how to conceive steering by the ethical and political ends in this type of research where piloting by the contracts of objectives and the means often impose their logic? Do not act with intention to harm the environment, act in accordance with its deepest convictions or refuse to adhere to the use that some major industrial groups have made of this technology is, in the main, the concrete contribution they make to sustainability in this important project. It's not nothing. Nevertheless, today it is impossible to say that GENIUS should be defined as an inherently "sustainable" project. Moreover, the experts who have the capacity and for some already the desire to lead a thorough reflection on the subject to transform it. If it touches this year to an end, remains the open possibility that Future projects of this magnitude require serious analysis and coordination on this topic, all sciences involved, this time before the definition of the research project, using the human sciences in a closer harmonization than it could have been currently carried out in this project. While keeping in mind that the production of knowledge, whatever the sector of activity, can always serve a social project socially equitable and ecologically sustainable.

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7. (2013) Sur les 54.6 millions alloués à divers autres projets tels que BREEDWHEAT (qui combine technologies de génotypage et de phénotypage à haut débit pour identifier les facteurs génétiques impliqués dans les caractères d'intérêt agronomique tels que le rendement, la qualité et la tolérance aux stress biotiques et abiotiques) ou encore ProBio3 (qui vise à développer une nouvelle filière de production de biocarburants).
8. Ils permettent de réunir des chercheurs experts pendant près de 8 ans, temps rarement accordé par les financeurs, nommé "investissement d'avenir", offrant de la pérennité sinon de la durabilité à cette recherche. Sont ainsi réunis 10 pôles scientifiques du secteur public (INRA, CIRAD et l'université Lyon III), ainsi que 4 partenaires privés, entreprises expertes mondiales en biotechnologies et semenciers français: Biogemma (Société française de biotechnologie végétale. Biogemma a pour fondateurs et actionnaires Limagrain, RAGT, Euralis, Sofiprotéol et Unigrains); Germicopa (créateur variétal spécialisé en pomme de terre); Pépinières et Roseraies G. Delbard (pépiniériste français, créateur variétal spécialisé en rosiers et arbres fruitiers); Vilmorin & Cie (producteur français de semences).
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10. Extrait d'entretien réalisé au sein de l'INRA auprès d'un(e) chercheur(se) du programme GENIUS (mai 2017). Cette identification du rôle de chercheur(se), comme créateur et transmetteur de connaissance fût majoritairement exprimé lors des entretiens menés chez GENIUS. Se garder de développer les connaissances en science et technoscience est vécue comme une orientation dangereuse. Toute découverte comportant des risques, ces chercheur(se)s ont pour beaucoup intégré l'idée que toute connaissance pouvait être bien ou mal utilisée, si bien que c'est pour eux à la société civile, par la voie démocratique et celle de ses choix de consommation, de faire connaître ses besoins et désir d'usage pour chacune(s) d'elles. (Voir troisième partie de l'article).
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15. (2017) Extrait d'entretien réalisé auprès d'un(e) chercheur(se) de structure publique, membre du groupe GENIUS.
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23. La majorité des scientifiques consulté(e)s ont formulé un sentiment d'indépendance quant à l'orientation de leurs travaux. Trois d'entre eux ont en revanche exprimé la présence de contraintes extérieures, parfois mal vécues, orientant leurs objets de recherche, allant parfois contre leurs volontés personnelles. Deux d'entre eux ont mentionnés une souffrance ressentie quant à certains éléments du projet relatifs aux intérêts de financeurs dont le programme dépend.
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26. C'est la simple continuité de l'expertise agronomique » indique ce(tte) même biologiste. La production d'un discours rassurant, visant ainsi à anticiper les craintes citoyennes à l'égard de ce qui est globalement compris comme une modification trop intrusive de la

nature, vient immédiatement tempérer la valorisation de l'innovation précédemment invoquée. Il s'en suit un positionnement double, qui a bien d'autres égards n'a de cesse de se confirmer et qui rend compte de la tension sociétale qui entoure les scientifiques.

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28. L'INRA est un EPST sous la double tutelle des ministères de la recherche et de l'agriculture. Le Président de l'Inra est désigné par le Gouvernement après une double audition par l'Assemblée Nationale et le Sénat sur la base des orientations scientifiques qu'il défend. Les orientations générales de l'INRA pour la période 2010-2020 ont été définies selon un processus qui incluait une démarche participative et citoyenne.

29. Les scientifiques interrogés ont massivement exprimé le fait que la modification génétique des plantes était perçue par eux comme la continuité historique de la recherche scientifique et que de ce fait, il n'était pas pertinent de l'entraver, car cela reviendrait à freiner le développement de nos connaissances du monde.

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32. Bien que le même type de compréhension du monde soit majoritairement partagé par les membres de GENIUS, la jeune génération (jeunes entrés en poste depuis moins de 5 ans et stagiaires) ne définissent jamais la durabilité comme un mot valise qui sert de faire-valoir aux projets de recherche en peine de financement. Ils en



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