CIRAD's position on

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AGRICULTURAL RESEARCH
FOR DEVELOPMENT

Modern genome editing technology

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The CIRAD-IFREMER-INRAE Committee on Ethics in Agricultural Research issued a statement in March 2018 on the latest plant genetic improvement techniques, in response to a joint request from the Presidents of the three organizations.

Like INRAE, CIRAD welcomes the ten recommendations made by the Committee. The two institutions recognize the appropriateness of the level of philosophical debate to which the statement refers, particularly as regards agroecology, which it says can either be conceived as a systemic agronomic approach that favours an understanding and control of the interactions between organisms within ecosystems, or take account of the social and political links between varietal breeders or farmers.

This second approach, which is both broader in scope and highly trans-disciplinary, encompasses the question of the development and use of technology within a process that covers social and political aspects, which are not directly controlled by scientists but also by citizens and decision-makers. This concept seems particularly relevant in the case of biotechnology. It must enable researchers to work to develop such new genetic improvement techniques while also querying current or future upheavals linked to their application, on an environmental, economic, legal and ethical level. Society's decision whether to use them lies on another level, which is political but which does not exclude science. In this document, CIRAD states its position regarding the conditions for the use of genome editing techniques and more generally any existing and future biotechnology likely to have an effect on the environment, health or the economy that might profoundly modify agricultural production systems worldwide, and particularly in the global South.

CIRAD subscribes fully to the strategic positioning elements set out by INRAE, notably the six principles used to steer its operations within France, to further agricultural development in the country's ultraperipheral regions.

However, given that its global remit means that CIRAD does not conduct its research in the global South alone but in partnership, it wishes to supplement those strategic positioning elements with others more specific to this context. Each of the principles set out by INRAE is presented below, with details of the consequences of CIRAD's specificity: global scientific cooperation.

Since its partners in the global South may ask it to use genome editing, either in the laboratory or in the field, during its overseas operations, and in view of the surrounding issues and debate, CIRAD feels that it is important to inform its partners and the authorities in the countries concerned of the conditions for CIRAD's use of that technology ●

Principle 1

Maintaining appraisal capacity in line with CIRAD's public research remit

CIRAD considers that its public research remit and corporate responsibility require it to explore the potential benefits of genome editing technology for plant varietal improvement and to analyse their limitations and characterize the possible health, environmental and socioeconomic risks of any by-products of such technology and their use. It considers that it would be irresponsible to leave such technology to overseas public- and private-sector players and rob France of the appraisal capacity that is essential to any public action on a political, regulatory, economic or environmental level.

This principle of building scientifically independent and unbiased public appraisal capacity for use by the authorities also applies to the countries in the global South in which CIRAD conducts research in partnership. In the specific case of advanced biotechnology, CIRAD's scientific partners or government agencies may ask it to support them in building the necessary expertise and technical and regulatory tools to enable them to decide on the merits of developing and applying such technology or measuring its impact.

In the countries in which it works, CIRAD, through its researchers, can respond to requests for support by virtue of their expertise, but cannot make the decision as to whether to use the biological products of such technology, since that is not its responsibility. It must also be capable of helping to train national experts who will subsequently be in a position to support public policy building in their respective countries. To provide the authorities with such appraisal capacity and help train its partners while respecting the ninth principle set out in its code of ethics, CIRAD must maintain the necessary expertise, which means involving some of its researchers in projects in France and with partners overseas that will enable them to master the latest technological advances ●

Principle 2

Technology vital to knowledge building

Modern genome editing technology can be used to explore genetic variability and study gene functioning, regulation and evolution, which is vital to boosting knowledge and understanding the living world. It has contributed to the emergence of new scientific avenues, which CIRAD is duty-bound to explore.

The new knowledge of genetic variability and its potential uses obtained by genome editing, and the growing availability of sequence data, are potential ways of addressing issues that are increasingly important in the light of the challenges posed by sustainable development and climate change. The freedom of research – which is conducted according to regulations set by individual countries – to explore these new avenues must be preserved, without arbitrarily excluding certain types of technology or prejudging decisions as to their use, which are not the responsibility of the scientific community alone. That freedom must also be accompanied by constant, sustained attention to the potential risks of appropriation of the genetic resources that technology may generate. The possibility of reproducing gene sequences, leaving no traces, without using biological material, could serve to circumvent current regulations on the recognition of intellectual property rights, sharing of benefits, and GMOs, on a European level. Furthermore, those regulations are not recognized or applied consistently in the countries of the global South in which CIRAD works in partnership. CIRAD undertakes to encourage its partners to use French and European principles and regulations to frame their common projects. Whether partners are public- or private-sector, it is committed to ensuring, in each case, that local authority approval has been obtained, specifying the regulatory framework that will apply to project operations ●

Principle 3

Use of genome editing technology for plant breeding

It is logical to assess the possibilities offered by genome editing techniques in addition to conventional plant breeding tools. The target species and traits will be chosen with a view to ensuring shared benefits, for uses and production systems that fit into a logic of environmental, economic and social sustainability, for instance with a view to reducing synthetic pesticide use or adapting to climate change.

Generating new knowledge of genome editing technology could also serve to return to breeding by crossing, making use of natural genetic diversity, so as to remain within the framework of current European legislation. This virtuous approach can easily be envisaged for plants whose reproductive biology allows for low-cost breeding schemes. However, it has its limitations for crops for which costs would be too high, notably due to the length of their reproductive cycle. In this case, developing new varieties could use genome editing to modify that cycle directly. The temptation to disseminate plants produced in the laboratory directly in the global South, without the necessary field trials, would be great for those looking for a quick profit or return on investment. Such direct use is difficult to monitor or control outside France and Europe. As a result, CIRAD will pay close attention to how collaboration agreements are worded, particularly in a context of multiple partnerships.

In general, when CIRAD researchers are required to use their expertise for projects conducted in the global South with private- or public-sector partners, they should contribute, by training local partners, to the simultaneous development of capacity to control and monitor the use of the research outputs generated by those projects ●

Principle 4

Experimental operations

Plants obtained by genome editing are created and characterized under confined conditions, in a laboratory or greenhouse, in line with European and national regulations. Any proposals for field trials to confirm their agronomic, technological and environmental properties must be submitted to an expert committee, before being forwarded to the authorities specified in current regulations, both in France and overseas. That committee, whose composition will be decided after consulting the Science Council, will determine whether it is appropriate to use genome editing technology rather than alternative methods, and assess the potential contribution of the planned varietal improvements to the agroecological transition.

While it is easy to acquire knowledge of how to monitor technological advances through research projects under confined conditions, field trials require particular care.

In line with its code of ethics, CIRAD will refuse, "in the absence of local legislation, to conduct experiments that would not be authorized in France. In the case of a request from overseas partners, before embarking on a partnership, CIRAD will consult the existing national appraisal and ad hoc advisory bodies. In the event of a value conflict or diverging views in the advice received or for want of advice, CIRAD undertakes to ask the INRAE-CIRAD-IFREMER Joint Ethics Committee for help with making a decision".

As either the instigator or the leader of a project, CIRAD is therefore obliged to apply to the High Council for Biotechnology (HCB) prior to implementation. If asked by its partners to assess the impact of using plants generated by genome editing, or equivalent technology developed locally, in the field, it will only do so in countries with appropriate legislation, and will ensure that its partners respect that legislation.

In countries without such legislation, it will restrict itself to supporting the building of a suitable legislative framework.

The expert committee will be part of the Office of the Director General in charge of Research and Strategy. The CIRAD Science Council will be invited to express an opinion on how it operates, its composition and its evolution ●

Principle 5

Open research

With regard to the use of genome editing technology for plant breeding, CIRAD remains true to its principle of openness, and recommends co-building research projects within a multidisciplinary, multi-stakeholder approach.

In line with CIRAD's partnership philosophy, that approach should not be restricted to the use of the technology itself. In accordance with the recommendations of its Ethics Committee, it should also apply to the societal debate on the use of such technology, which should be shared by means of co-building and training ●

Principle 6

Intellectual property

CIRAD supports free access to all genetic resources, as per international agreements. It recommends promoting Plant Variety Protection (PVP), which guarantees genetic progress and its dissemination to farmers, recognizes farmers' right to produce and use farm-saved seed and encourages genetic progress by means of open, free access to the gene pool, while ensuring a return on breeders' investments in research and development. If the plant variety intellectual property regime were to change, CIRAD would defend the values associated with PVP and the non-patentability of plants obtained by genome editing.

CIRAD is not in favour of patenting the living world, whether varieties or genes, despite the heavy pressure on the authorities, notably on the part of certain major economic operators. It will take care to ensure that genome editing does not insidiously become responsible for the disappearance of the PVP varietal registration system. Were the use of genome editing to become the rule, with the possibility of patenting genes, the number of modifications made gradually would make it impossible for CIRAD and its partners to re-use commercial varieties in their own varietal improvement programmes. Such re-use would mean eliminating the mutations introduced by genome editing, which will be virtually impossible once there are too many.

By virtue of its capacity to conduct trans-disciplinary operations within a context ranging from the laboratory to agricultural production operatives, CIRAD is determined to work with its partners to counter the adverse impact of the use of such technology on the PVP regulatory framework, for its partners in the global South ●

Lastly, CIRAD considers that these shared principles now cover use of genome editing and associated tools beyond the plant kingdom and the crops initially concerned. Those principles must allow researchers to apply the same rules to their use within the animal kingdom, for microorganisms and for insect vectors, for instance, a field of research and application that will almost certainly expand in the coming years, in the light of climate change and its impact on emerging diseases, in both the plant and the animal kingdom. In its September 2019 statement on genetic modification of animals, the Ethics Committee made five recommendations in this respect. Once again, the Committee has highlighted society's demand for information. There has been some debate among civil society on this topic, but much less so than on the direct application of such techniques in the field of crop breeding. Backed by the relevant regulations and documents issued by the High Council for Biotechnology (HCB), the role of CIRAD researchers, besides the technology aspect, is to build a rigorous scientific approach to fuel policy and societal debate on both a national level and within its partnerships in the global South ●

CIRAD is the French agricultural research
and international cooperation organization working for the sustainable development of tropical and Mediterranean regions

Working together for tomorrow's agriculture

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