

# TO DIE OR NOT TO DIE THIS IS THE PROBLEM

*Do not conform yourselves to this age...*  
(Rm 12,2)

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Comments to the

KASISI AGRICULTURAL TRAINING CENTRE  
and  
JESUIT CENTRE FOR THEOLOGICAL REFLECTION

Study:

**WHAT IS THE IMPACT OF GMOs ON  
SUSTAINABLE AGRICULTURE IN ZAMBIA?**

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# ABSTRACT

The study presented by Kasisi Agricultural Training Centre (KATC) and the Jesuit Centre for Theological Reflection (JCTR, on-line at <http://www.jctr.org.zm/gmos.htm>) shows several inconsistencies and is based on dangerous premises. In fact, study's proposal can jeopardize the lives of the Zambian citizens both on short and long term perspective.

We summarize our critique in three points. For each point we provide proof for the inconsistencies.

1. **Politics not Science.** Even if the document is presented as a scientific work, it shows, from the beginning, opposition to GM crops not on scientific data but on economic grounds in the interest of specific groups which they mention in the Introduction.
2. **Tricks not Truths.** The document is deceiving on the following:
  - a. *Food Safety.* It claims that GM aids has to be rejected because there is no scientific evidence that they are safe for human consumption. This is not true for at least 2 reasons. First, there are many scientific studies that attest that GM food are as safe as conventional food. Second, and even more seriously, the JCTR indicates as acceptable the milling of corn (<http://www.jctr.org.zm/gmos.htm>), emphasizing that the main concern is of environmental/economic order. This is even more evident in the Ethical Considerations of the JCTR study, where little mention is made about food safety of GMOs;
  - b. *Selective Quotation and Junk Science.* The study quotes various paper related to GM plants, but the citations are limited either to those sentences or to those papers supporting its thesis. Nevertheless most of the argumentations are taken by non referenced studies or from rebutted papers.
3. **Christian Priorities.** The JCTR document worries about the possibility of organic farming in presence of GMOs, or the possible death of some soil microorganisms because of this new technology, but it does not consider the possibility that some Zambians could die of starvation by refusing the products of such technology. The Catholic Church emphasizes the dignity of the human being as prominent and superior to any other living creature. Therefore, the rejection of aid on the grounds expressed in the document, and defined "courageous" by the JCTR, seems not be in line with the Catholic tradition.

# OBSERVATIONS

The study presented by Kasisi Agricultural Training Centre (KATC) and the Jesuit Centre for Theological Reflection (JCTR, on-line at <http://www.jctr.org.zm/gmos.htm>) shows several inconsistencies. Here we provide only some selected examples for these inconsistencies: a comprehensive list of all the critiques (which we are willing to provide upon request) would require much more space and time. We also explain why the JCTR document risks the lives of Zambian citizens.

(Quotations from the JCTR document are *in italic*; **bold character** is used by us to emphasize)

## 1. Politics not Science.

A scientific document ought to start from scientific premises and lead to scientific conclusions. The JCTR document, even though presented as if it were a research work, starts from economic considerations and uses “pseudo-science” as a tool in supporting its thesis. As a result, the study merely serves the interests of specific economic groups in Zambia. This is evident from the beginning of the document which underlines how there are currently three major groups in Zambia that are concerned about introducing GMOs into the country. None of these groups has a scientific concern about GMOs, while all of them are business-oriented. We quote here the description made in the document itself of these groups:

- i. *Specialised associations such as the Tobacco Association of Zambia, the Zambia Export Growers Association, and the Zambia Coffee Growers’ Association Ltd. **This group is concerned with the effect GM crops would have on competitiveness and their potential loss of access to European export market.** Because of European rejection of GM crops, members of this group see that they will lose this market. (however the tobacco and coffee growers can be assured that growing GM maize cannot contaminate their crops, as it is impossible for these crops to cross pollinate with each other)*
- ii. *In addition to the loss of the export market, the **Organic Producers and Processors Association of Zambia is concerned with effects of genetically modified crops on sustainable agriculture within this county.** (remember that a product to be called “organic” has to be GMO-free)*
- iii. *Moreover, there is widespread growing concern among small-scale farmers (who comprise more than three-quarters of the farming population in the country) about the effects of genetically modified crops on the informal seed sub-sector, which supplies 80 per cent of their planting seed in the country. **This group is also concerned with the higher seed price for GM crops in comparison to the seed currently grown in the country.***

The **Introduction** itself claims that the document is written to demonstrate that “*GM crops are likely to bring many problems including serious negative effects on the development of small-scale farming in Zambia – the basis for the country’s food security system. We argue that GM crops will drastically and dangerously alter the infrastructure of Zambian agriculture*”.

This makes clear that the document was written not for a scientific purpose but rather to avoid the introduction of GM crops in Zambia. The clear intentions of the document, then, are political and economic.

In fact, all concerns expressed in the **Preface, Ethical Consideration** and **Conclusions** make little mention about food safety, and they are all focused on economic and environmental issues. Indeed the document stresses as “*the critical point of debate must be that the very serious problem of food consumption (the presence of hunger) must not be dealt with in ways that create even more serious problems of food production*”. So, even in presence of starvation, “*production, trade and marketing*” come first.

This approach to GMOs is clearly an effort to achieve political and economic advantages, and has nothing to do with a scientific/research approach.

## 2. Tricks not Truths.

The JCTR document is based on two subtle deceptions. First, the use of food security as a shield for economic interests and, second, the use of selective quotation or data from unknown sources to support their thesis.

### a. FOOD SECURITY

Food security is a well-known problem among scientists. GM food safety assessment has been and is the subject of hundreds of studies. For instance a European Union Commission report on GMOs, involving 400 Public Research Institutes and 70.000.000 € in a 10 years study<sup>1</sup>, was released last year. This research found that GM crops available on the market behave as their conventional counterparts<sup>2</sup>, and are at least equally safe.

The JCTR study ignored such studies, and uses food safety concerns to stop food aid shipments. Moreover they seem not to be particularly afraid about the GMOs safety. In their site<sup>3</sup>, in fact, it is stated: “*The USA can be asked to convert their “donation” into the safe-way that Zambia wants and deserves, both by milling GMO maize and by purchasing non-GMO maize.*” This position is questionable at least for two reasons: first, the milling does not change the characteristics of GMOs as far as food safety is concerned. If there is any risk connected to their consumption, it will persist also in the maize flour. Second, the claim that US citizens have eaten unsafe food for ten years, and still do, is not based on scientific data and does not consider the complexity and efficiency of the American safety control system (USDA, FDA, EPA), even in respect of the Zambian one.

<sup>1</sup> <http://europa.eu.int/comm/research/quality-of-life/gmo/>. On this topic many other studies could be listed, but this is not in the intention of the present document.

<sup>2</sup> See also: Nature 409, 8 February 2001. 682-683

## b. SELECTIVE QUOTATION AND JUNK SCIENCE

The JCTR document contains severe shortcomings in presenting scientific data. As an example, no mention is made of the studies that conclude that GMOs, which scientists and authorities have found to be safe, do not present peculiar risks for the environment or the consumer. These studies prove a consensus on GMOs. Nevertheless, citing as prominent geneticist green activists as Mae-wan Ho<sup>4</sup>, the document claims that GMOs could be harmful for the environment, for feed and food consumption, but without quoting any scientific paper supporting the statement. On the other hand, quotations from scientific publications are limited either to those sentences or to those few papers that support the desired conclusions.

It is not possible to list all the inaccuracies present in the document. Therefore we provide here a selection of shortcomings classified under three “capital vices”.

1. **Selective Quotation** to reach predefined conclusions;
2. **Superficial Reading** of papers and **Poor Knowledge** of the topic that lead to a misinterpretation of scientific results;
3. **Ideological Approach** to biotechnology, nature and evolution leading to a distorted perception of technology in the human development.

### *1. GMOs yield, Glyphosate Toxicity and Selective Quotation.*

The first conclusion of the JCTR document states that:

[GMOs are likely to cause] *increased herbicide use, erratic performance and poor economic returns to small-scale farmers.*

This conclusion is backed, according to the document, by several studies among which the following one.

*The University of Wisconsin found GM soyabean yields from the 1998 harvest were lower than non-modified varieties in over 80 per cent of cases in trials across nine states in the USA.*

There is a general misunderstanding about GMOs and yield. The Roundup Ready Soybean (RR) and the Bt maize were not developed to increase yield but to provide better weed control and pest management. The yield drag mentioned by the JCTR study is not unique to RR soybean, but is a standard phenomenon whenever a resistance gene is crossed into a crop variety. Yield drag in soybean is nothing new, and has been known to happen when a trait from a wild soybean is bred into modern varieties<sup>5</sup>. For this reason, present RR soybean and Bt maize<sup>6</sup> could lead to increased yields only in

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<sup>3</sup> <http://www.jctr.org.zm/gmos.htm>

<sup>4</sup> Mae-wan Ho cannot be considered, by any scientific standards, a geneticist, having performed no published research in this field. Her commentaries can be found at [http://www.i-sis.org.uk/SO\\_papers.php](http://www.i-sis.org.uk/SO_papers.php)

<sup>5</sup> Lambert, L. and J. Tyler. 1999. Appraisal of insect resistant soybean, p. 131 148. In: B. R. Wiseman and J. A. Webster (eds.), Economic, environmental, and social benefits of resistance in field crops. Entomological Society of America, Lanham, MD.

<sup>6</sup> See also: RESPONSE TO THE U.K. SOIL ASSOCIATION'S: [www.agbioworld.org](http://www.agbioworld.org) . Oct. 2/02

the presence of weeds and pests. Several studies demonstrate that, for RR soybean, the yield is a bit less but, “despite lower yields and more expensive seed, producers will continue planting RR. Farmers are willing to pay some penalty for the better weed control”<sup>7</sup>. Indeed, in Brazil, where the cultivation of RR soybean is illegal, farmers defy their government in order to plant RR soybeans, and smuggle the seeds from neighboring Argentina. Other studies instead outline as the GMOs have led to a net gain for both environment and farmers as the one of the *National Centre for Food and Agricultural Policy*<sup>8</sup> (June 2002, already available to the JCTR). This shows the RR has no net gain in yield but lower management costs translating into better incomes for farmers and a drastic reduction in the use of chemicals.

Case Study	Crop	Type	Production (per year)			Total Net Value (000\$/yr)	Pesticide Use (lbs AI/yr.)	Acreage
			Volume (000lb.)	Value (000\$)	Costs (000\$)			
1	Papaya	VR	+53,000	+17,000	0	+17,000	0	1,600
2	Squash	VR	+6,000	+2,000	+375	+1,625	0	5,000
24	Canola	HT	0	0	-11,000	+11,000	-531,000	871,000
26	Soybean	HT	0	0	-1,010,765	+1,010,765	-28,703,001	50,016,000
28	Field Corn	IR (1)	+3,540,992	+126,466	+1,110	+125,356	-2,603,456	14,927,000
31	Field Corn	HT	0	0	-58,050	+58,050	-5,805,000	5,805,000
32	Cotton	IR (1)	+185,373	+115,002	+12,034	+102,968	-1,870,100	5,144,000
34	Cotton	HT	0	0	-132,676	+132,676	-6,169,000	9,301,000
<b>Total</b>			<b>+3,785,365</b>	<b>+260,468</b>	<b>-1,198,972</b>	<b>+1,459,440</b>	<b>-45,681,557</b>	

from: NCFAP, Plant Biotechnology: Current and Potential Impact For Improving Pest Management In U.S. Agriculture  
An Analysis of 40 Case Studies

*Genetically modified crops require more herbicides than what farmers were initially led to believe, leading to increased weed management costs.*

The table above demonstrates that, for the 40 cases analyzed, the total use of pesticide in 2001 was reduced of about 21.000 tons due to the adoption of GM crops. The failure to cite this study or to provide alternative explanations to their data, witnesses a failure to discuss or present different views.

*Most of the research by the biotech industry has focused on making crops resistant to their own “broad-spectrum” herbicides. The problem is that while Roundup is promoted as an environmental friendly herbicide, its principal ingredient, glyphosate, has been found capable of killing fish, reducing the growth of earthworms (beneficial organisms that are essential in breaking down plant material into soil) and increasing their mortality. Glyphosate is also reported to be toxic to many of the beneficial mycorrhizal fungi which help plants to take up nutrients from soils.*

The dose makes the poison, as all the toxicologists know. Any substance or food becomes poisonous at a certain level. For instance Aspirin or iron fortifiers for pregnant women are causes of death in the US even though their use is not questioned by

<sup>7</sup> <http://ianrnews.unl.edu/static/0005161.shtml>

<sup>8</sup> <http://www.ncfap.org/40CaseStudies.htm>

anybody. In the case of glyphosate there is a lot of literature about its very low toxicity. We quote here only some significant data available on the internet<sup>9</sup>:

- Acute toxicity: Glyphosate is **practically nontoxic by ingestion**, with a **reported acute oral LD50 of 5600 mg/kg** in the rat.
- Chronic toxicity: Studies of glyphosate lasting up to 2 years, have been conducted with rats, dogs, mice, and rabbits, and **with few exceptions no effects were observed** [96]. For example, in a chronic feeding study with rats, no toxic effects were observed in rats given doses as high as 400 mg/kg/day [58]. Also, **no toxic effects were observed in a chronic feeding study with dogs fed up to 500 mg/kg/day**, the highest dose tested [58,97].
- Effects on aquatic organisms: Technical glyphosate acid is **practically nontoxic to fish and may be slightly toxic to aquatic invertebrates**. The 96-hour LC50 is 120 mg/L in bluegill sunfish, 168 mg/L in harlequin, and 86 mg/L in rainbow trout [58]. The reported 96-hour LC50 values for other aquatic species include greater than 10 mg/L in Atlantic oysters, 934 mg/L in fiddler crab, and 281 mg/L in shrimp [58]. **The 48-hour LC50 for glyphosate in Daphnia (water flea)**, an important food source for freshwater fish, is **780 mg/L** [58]. Some formulations may be more toxic to fish and aquatic species due to differences in toxicity between the salts and the parent acid or to surfactants used in the formulation [58,96]...

It appears (see also<sup>10,11,12</sup>) that glyphosate is one of the least toxic herbicides available on the market, also considering that the amount used for field application is exceedingly small in respect to the doses used in these experiments. The JCTR study does not make any comparative analysis between the use of this compound and alternatives available. This comparison is necessary because every choice has a cost. For example, not controlling weeds might apparently be very beneficial to the environment, but not to the farmer because of heavy yield losses. Weed control by mechanical means (ploughing) is an alternative, but is not environmentally friendly and it is very laborious. Hoeing, which substitutes human labor for a viable alternative, is not friendly to the environment, either. In fact, lots of earthworms get cut in the process, mycorrhizae are disrupted, soil is exposed and becomes susceptible to erosion and loss of moisture. The JCTR's focus is only on glyphosate. They have a target, but this is not sustainable agriculture or low environmental impact.

It is actually true that there are some formulations of glyphosate that could be toxic to particular species. For example, Roundup Ultra is toxic to fish. For this reason, the use of Roundup Ultra is not permitted where runoff can get into a water supply, or for use in aquatic weed control. Another formulation of glyphosate, Rodeo, is available for use in these areas where fish are present.

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<sup>9</sup> <http://ace.ace.orst.edu/info/extoxnet/pips/glyphosa.htm>

<sup>10</sup> <http://ehp.niehs.nih.gov/ntp/docs/tox16/tx16abs.pdf>

<sup>11</sup> [http://www.monsanto.com/monsanto/content/products/productivity/roundup/gly\\_bestsources\\_bkg.pdf](http://www.monsanto.com/monsanto/content/products/productivity/roundup/gly_bestsources_bkg.pdf)

<sup>12</sup> <http://www.nature.com/nsu/980702/980702-2.html>

The JCTR document is similarly deceptive regarding Bt insecticide (Compare the JCTR text on Bt with some scientific literature see: <sup>13, 14</sup>).

*In the tight competition of ensuring that once a farmer has bought seed of a particular crop which is genetically modified to resist a particular herbicide, that farmer is also tied to purchasing that particular brand of herbicide (i.e. the one the GM crop has been modified to resist) from the same company or sister company that sold him/her the GM seed.*

The patent for Roundup has expired, and in the US there are more than 15 generic brands of glyphosate available on the market. For this reason it could be conceivable that other companies, even a Zambian one, could produce Roundup and sell it to Zambian farmers at prices lower than Monsanto. Indeed, many do.

Another point has to be made on the impact of biotechnology on small-scale farmers. Carl E. Pray and Danmeng Ma<sup>15</sup> reported that:

“A sample of 283 cotton farmers in Northern China was surveyed in December 1999. Farmers that used cotton engineered to produce the *Bacillus thuringiensis* (**Bt**) toxin **substantially reduced the use of pesticide without reducing the output/ha or quality** of cotton. This resulted in substantial economic benefits for small farmers. Consumers did not benefit directly. **Farmers obtained the major share of benefits** and because of weak intellectual property rights very little went back to government research institutes or foreign firms that developed these varieties. **Farmers using Bt cotton reported less pesticide poisonings** than those using conventional cotton.”

Hence it is clear that **THE FIRST CONCLUSION OF THE JCTR STUDY**, namely that GMOs are likely to cause “*increased herbicide use, erratic performance and poor economic returns to small-scale farmers*”, is **NOT SUPPORTED BY SCIENTIFIC DATA**.

Another consideration has to be made about this JCTR conclusion: if their statement is true, why GMOs acreage is increasing year by year now reaching 52 million hectares worldwide? Why USA, Canadian, Indian, Chinese farmers keep on buying more expensive seeds, using more pesticide than with conventional variety, for an even smaller economic return in respect to “conventional farming”?

## ***2. Junk Science and Poor Knowledge***

In spite of the fact that this information is widely available, the JCTR document avoids explaining biotechnology or what the data truly demonstrate. Here we provide

<sup>13</sup> Munkvold,-G.P.; Hellmich,-R.L.; Rice,-L.G Comparison of in fumonisin concentrations kernels of transgenic Bt maize hybrids and nontransgenic hybrids. *Plant-dis* Feb 1999. v. 83 (2) p. 130-138

<sup>14</sup> A. M. Shelton, J.-Z. Zhao, and R. T. Roush. Economic, Ecological, Food Safety and Social Consequences of the Deployment of Bt Transgenic Plants. *Annu. Rev. Entomol.* 2002. 47:845–81. “Bt plants were deployed with the expectation that the risks would be lower than current or alternative technologies and that the benefits would be greater. Based on the data to date, these expectations seem valid.”

<sup>15</sup> Carl E. Pray and Danmeng Ma. Impact of Bt Cotton in China. Forthcoming in *World Development*. May 2001 issue (Vol.29, No. 5) [pray@aesop.rutgers.edu](mailto:pray@aesop.rutgers.edu)

examples that show how the JCTR text evades facts so that it may rush to its conclusion:

*As soon as a GM crop is released, it will contaminate other non-GM plants through pollination. For example, wild maize in Mexico, which is the origin of new maize genetic material, is now contaminated by GM maize.*

In this sentence the author(s) refers to the Quist paper<sup>16</sup>, but fails to mention that this paper was disavowed by Nature some months later with these words: “**The authors have now obtained some additional data, but there is disagreement between them and a referee as to whether these results significantly bolster their argument.**”<sup>17</sup>. The same magazine issue published two critiques to the Quist paper **but the JCTR study fails to mention them**. On the other hand the Quist paper is itself misinterpreted because the introgression claimed by that paper is not referred to maize wild relatives, but to Mexican landraces, native Mexican varieties genetically modified through selective breeding<sup>18</sup>.

*(...) multiple herbicide resistant plants were a result of cross-pollination between three GM canola varieties caused by pollen drift from neighbouring fields each of which had been modified to resist a particular type of herbicide.*

*The problem with these multiple herbicide resistant plants is that they have become difficult to eradicate with existing herbicides.*

The first consideration is that cross-pollination between varieties is a characteristic of all existing plants that possess pollen driven propagation. Moreover, herbicide resistant plants have been known for half a century, but nobody has ever used the term “genetic contamination” in regard to them. Secondly, the case study cited by JCTR about multiple herbicide resistance<sup>19</sup> is not about cross pollination between three GM plants but between two GM crops and a traditionally bred herbicide resistant one<sup>20</sup>. This clarifications doesn’t change the problem, but highlights the way in which scientific literature is being read by experts at the JCTR. Keith Downey, the inventor of modern canola, commented about these “superweeds”:

“We haven't created a superweed or anything like that. Adding 2,4-D or a similar herbicide to a chemical mix will kill any wayward weeds.”<sup>20</sup>

### ***3. The Idea of Nature and Ideology in JCTR***

A misleading aspect of the JCTR document is the confusion about evolution, plant breeding and biotechnology in general. Therefore all the definitions and considerations stem from an anti-technology prejudice. These seem to origin from a world view

<sup>16</sup> Nature 414, 29 novembre 2001. 541-543

<sup>17</sup> Nature 416, 11 aprile 2002. 600-601

<sup>18</sup> for the whole story see also: [http://www.agbioworld.org/biotech\\_info/articles/mexmaizeresource.html](http://www.agbioworld.org/biotech_info/articles/mexmaizeresource.html)

<sup>19</sup> *These multiple herbicide resistant plants were a result of cross-pollination between three GM canola varieties caused by pollen drift from neighbouring fields each of which had been modified to resist a particular type of herbicide (JCTR study, p. 13).*

<sup>20</sup> <http://www.producer.com/articles/20000210/news/20000210news01.html>

originating from the myth of Mother Nature or New Age. An example for each of these statements is provided:

*In conventional traditional forms of breeding, variety has been achieved through selection from the multitude of genetic traits that already exist within a species' gene pool. In nature, genetic diversity is created within certain limits.*

This does not correspond to real life. Nature, in fact, does not care at all about biodiversity unless the result is fit to survive natural selection. Moreover, evolution seems unaware of limits we might try to impose. The genetic variability that exists on earth is hardly explainable using strict species boundaries<sup>21</sup>. Nature itself has developed several systems to overcome the species boundaries like polyploidy (the doubling of the genome, for example wheat has three different genomes AA-BB-DD) or hybridization.

On the other hand, crops are “unnatural” plants created by thousands of years of “artificial” selection and cannot survive without continuous care and protection by man<sup>22</sup>. This is because man selects the opposite characteristics than the ones selected by nature (such as a mature seedhead holding all the seeds in cultivated cereals, while wild ones disperse the seeds). Moreover, plant breeders did not cross only plants as allowed by nature, but performed “forbidden” crosses and improved nature’s genetic diversity long ago using methods such as irradiation with X-ray or gamma-ray<sup>23,24</sup> or embryo rescue.

*(...) In contrast, genetic engineering crosses the coded DNA barrier and utilises very powerful (and unnatural) laboratory techniques for transferring genetic material directly between plants and animals. (...)*

This approach considers manmade things as dangerous and unnatural<sup>25</sup>. This is a philosophical belief that has nothing to do with to date scientific knowledge<sup>26</sup>. Natural viruses, bacteria and transposons have for millennia been natural vectors of genetic material between or within species<sup>27, 28</sup>.

Nevertheless, the so called “unnatural laboratory techniques” (biotechnology) uses a soil-dwelling bacterium (*Agrobacterium*) modified with restriction enzymes that were found in other living organisms. This represents nothing else than the application of natural mechanisms to plant breeding.

It is also necessary to reaffirm that genes are genes. Genes produce proteins and do not have any essential or inherent character that makes the gene a “fish gene” or a “tomato

<sup>21</sup> Ochman, H. Lateral and oblique gene transfer. *Curr Opin Genet Dev.* 2001 Dec;11(6):616-9. See also: Venter et al. 2001. *Science* 291:1034-51.

<sup>22</sup> *Nature* 409, 8 February 2001. 682-683

<sup>23</sup> An example of cross between different species: Riera-Lizarazu O, Vales MI, Ananiev EV, Rines HW, Phillips RL. Production and characterization of maize chromosome 9 radiation hybrids derived from an oat-maize addition line. *Genetics.* 2000 156:327-39

<sup>24</sup> Robert M. Goodman, et. al. Gene Transfer in Crop Improvements, 236 *Science* 48-54 (1987)

<sup>25</sup> For the myth of “natural is good” see: Ames BN, Gold LS. Paracelsus to parascience: the environmental cancer distraction. *Mutat Res* 2000 Jan 17;447(1):3-13

<sup>26</sup> Nor is this position consonant with any enunciated position of the Church.

<sup>27</sup> See for example: Aoki S, Syno K. Horizontal gene transfer and mutation: ngor genes in the genome of *Nicotiana glauca*. *Proc Natl Acad Sci U S A.* 1999. 96:13229-34.

<sup>28</sup> The fact that this occurs in nature is by itself an obvious proof that genetic engineering is consistent with God’s creation.

gene” or a “human gene”. Obviously a fish, tomato, and human being are distinct living creatures but the totality of the genome makes a fish, a tomato, or a human being. Individual genes are simply individual genes that create specific proteins.

*Therefore, the presence of an improved biotechnology such as a hybrid seed of maize does not necessarily contribute towards food security of a country.*

The introduction of hybrid maize and the Green Revolution did not solve the problem of hunger, but it is undisputable that it reduced famine in the world<sup>29</sup> during the past 50 years. Denying that this occurred denotes a strong anti-technology approach. It is clear, in fact, that a technology is not an answer itself, but a tool to find answers. Generally people discuss how to use technology and not how to forbid its use. The JCTR, while criticising hybrid maize or biotechnology, does not suggest feasible alternatives.

### 3. Christian Priorities.

As detailed below, the JCTR document is filled with concerns about economy (1, 3, 4, 5, 6, 8), the environment (2, 7) and, only somewhat as a side problem, about human beings (7). This concern is about consumption of food that could have undefined “*long term effects*”. Moreover, as we tried to point out above, this is not a real concern to the JCTR, given that the milling of the grain is enough to solve the problem.

1. *Is it correct for one person or one company to claim ownership of and patent for a living organism?(...)*
2. *As soon as a GM crop is released, it will contaminate other non-GM plants through pollination.*
3. *How do we balance off the property rights of farmers versus the “Intellectual Property Rights” of a company? (...)*
4. *The food system is being controlled more and more by a few Trans-National Corporations(...)*
5. *The introduction of GM crops will make it impossible to grow an organic crop because of cross-pollination. (...)*
6. *GM crops will favour an industrialized agriculture. An industrialized agriculture will favour large farms and mechanization (...)*
7. *Another ethical question relates to the unknown consequences on other life forms of introducing GM crops. For example, Bt crops will kill some soil micro-organisms upon decaying. Is it correct to kill these life-giving organisms (...). We simple do not know the long term effects on the health of people. **There should be a cautious approach to the introduction of this technology into Zambia until we know more about its impact on humans and on the environment.***
8. *Genetic resources by themselves are of no value until... (still about genetic resources.)*

It seems indeed that the lives of some soil micro-organisms (7) are more important than the lives of human beings threatened by starvation. The document expresses the same concept also in the introduction, as already mentioned:

***the very serious problem of food consumption (the presence of hunger) must not be dealt with in ways that create even more serious problems of food production.***

The Hebrew-Christian tradition, on the contrary has its primary focus on the human being and its dignity; and being just and upright, and helping those in need, is held to be a higher virtue than the accumulation of wealth. Nor do those in this tradition worship Nature, but instead have a duty to be stewards of the gifts God has bestowed on us. Within this tradition, the environment has a

meaning because of man and man is viewed as the lord of all the creatures (Ps 8, 6-8). Therefore the care for the environment has a meaning inasmuch it is the caring of the “home” where humans live or will live. A care of the environment which contemplates the cost of human lives is, in our view, foreign to the essence of Christianity.

The Catholic Church has taken, on several occasions, a position on agricultural biotechnology which is well summarized in the statement issued by the Pontifical Academy of Sciences<sup>30</sup>. The position never condemns such a technology *a priori*<sup>31</sup>. It is aware of potential problems, demands caution and further studies, hopes that immediate economic returns may not be the only force driving the development of transgenic plants, but sees in the new technology a great opportunity especially for the developing countries. We are sincerely concerned that the JCTR study did not refer to this source when dealing with agricultural biotechnology, but rather referred extensively to documents from environmental organisations. **We urge the JCTR not to conform to this age (Rm 12, 2), but to examine the scientific evidence, to listen to the catholic tradition and to ponder the position of the church before condemning agricultural biotechnology.**

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Those of us who are of the Catholic faith are gravely concerned that some who pursue political or economic aims are increasingly doing so in the name of the Church. When they do this, they squander the reputation of the Church for worldly goals. If we have not shown that those who presume to speak in the name of the Church abase the hungry at the feet of those reigned by greed or ambition, or if we have not shown that some hold Nature to be a higher authority than the teachings of the Church, we ask that you notice another thing—that those who do not speak of faith or morals in the context of our creed speak only for themselves, and not for the institution that binds us. The Church has done much to encourage learning with the Pontifical Academy, and with its retraction of the verdict on Galileo. Yet others, in the name of the Church, now persecute anew science far more cruelly, for they do it at the expense of those who hunger. His Holiness Pope John Paul II has twice called on us, on World Food Day, to remember these words from the Lord’s Prayer: “Give us this day our daily bread”<sup>32</sup>. If we are to follow the will of God, what reason do we have to ignore the needs of those who hunger? All of us, Catholics and otherwise, say this: the JCTR has not shown us any reason, and as you read this, people die.

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<sup>29</sup> see [www.fao.org](http://www.fao.org)

<sup>30</sup> SCIENCE AND THE FUTURE OF MANKIND Science for Man and Man for Science, PONTIFICIAE ACADEMIAE SCIENTIARUM, SCRIPTA VARIA 99, 2001; available as pdf at: [http://www.vatican.va/roman\\_curia/pontifical\\_academies/acdscien/documents/sv%2099\(5of5\).pdf](http://www.vatican.va/roman_curia/pontifical_academies/acdscien/documents/sv%2099(5of5).pdf)  
The declaration on transgenic plants can be found at pages 516-526.

<sup>31</sup> See also for instance: homily of John Paul II at the Jubilee of the farming world (11-11-2000) [http://www.vatican.va/holy\\_father/john\\_paul\\_ii/speeches/2000/oct-dec/documents/hf\\_jp-ii\\_spe\\_20001111\\_jubilagric\\_it.html](http://www.vatican.va/holy_father/john_paul_ii/speeches/2000/oct-dec/documents/hf_jp-ii_spe_20001111_jubilagric_it.html)

<sup>32</sup> [http://www.vatican.va/holy\\_father/john\\_paul\\_ii/messages/food/documents/hf\\_jp-ii\\_mes\\_20011016\\_xxi-world-food-day\\_en.html](http://www.vatican.va/holy_father/john_paul_ii/messages/food/documents/hf_jp-ii_mes_20011016_xxi-world-food-day_en.html), [http://www.vatican.va/holy\\_father/john\\_paul\\_ii/messages/food/documents/hf\\_jp-ii\\_mes\\_20001017\\_xx-world-food-day\\_en.html](http://www.vatican.va/holy_father/john_paul_ii/messages/food/documents/hf_jp-ii_mes_20001017_xx-world-food-day_en.html).

# CONCLUSIONS

The study presented by Kasisi Agricultural Training Centre (KATC) and the Jesuit Centre for Theological Reflection:

1. **is not a scientific document.**
2. **represents the partial interests** of some Zambian economic groups.
3. **manipulates scientific data** to support its thesis.
4. **does not show a knowledge of the topic** sufficient to draw an informed judgement.
5. **is based on an idea of “Nature” foreign to the Hebrew-Christian tradition.**
6. **contradicts the position of the Catholic Church** towards agricultural biotechnology.
7. **seeks to justify starvation.**

Starvation in Zambia is no longer a possibility, but a reality. We consider it to be an unforgivable mistake to let people suffer famine for the reasons expressed in the JCTR document. We urge the Church to raise its voice to demand the acceptance of the food aid by the local Government.