

# TEACHERS' CONCEPTIONS ON ENVIRONMENT AND GMO IN TWELVE EUROPEAN COUNTRIES

Pierre Clément, Jérémy Castéra, Charline Laurent, Silvia Caravita, Anna-Liisa Rauma-Kosonen, Attila Varga, Jurga Turcinaviciene, Elwira Samonek-Miciuk, Adrienne Kozan-Naumescu, Paul Pace, et al.

## ▶ To cite this version:

Pierre Clément, Jérémy Castéra, Charline Laurent, Silvia Caravita, Anna-Liisa Rauma-Kosonen, et al.. TEACHERS' CONCEPTIONS ON ENVIRONMENT AND GMO IN TWELVE EUROPEAN COUNTRIES. Socio-cultural and Human Values in Science and Technology Education, IOSTE XIV, 2010, Bled, Slovenia. p. 227-230. hal-01026068

# HAL Id: hal-01026068

https://hal.science/hal-01026068

Submitted on 28 Jul 2014

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Clément P., Castéra J., Laurent C., Caravita S., Rauma-Kosonen A.-L., Varga A., Turcinaviciene J., Samonek-Miciuk E., Kozan-Naumescu A., Pace P., Pata K., Valanides N., Bogner F., Carvalho G. (2010). Teachers' conceptions on environment and GMO in twelve European countries. S. Dolinšek & T. Lyons (eds), Socio-cultural and Human Values in Science and Technology Education, Proceedings IOSTE XIV, Bled (Slovenia), IRI UL, Institute for Innovation and Development of University of Ljubljana, p.1418-1421 (p. 227-230 tome II).

.

# TEACHERS' CONCEPTIONS ON ENVIRONMENT AND GMO IN TWELVE EUROPEAN COUNTRIES

### Pierre Clément

University Lyon 1, France, Pierre.Clement@univ -lyon1.fr

## Jérémy Castéra

University Lyon 1, France, jeremycastera@gmail.com

#### **Charline Laurent**

University Lyon 1, France, Charline\_la@yahoo.fr

### Silvia Caravita

CNR, Roma, Italy, silvia.caravita@istc.c nr.it

## Anna-Liisa Rauma-Kosonen

University of Joensuu, Finland, anna-liisa.kosonen@uef.fi

## Attila Varga

National Institute for Public Education, Hungary, attila.varga@ofi.hu

### Jurga Turcinaviciene

University of Vilnius, Lithuania, jurga.turcinaviciene@gf.vu.lt

#### **Elwira Samonek-Miciuk**

University of Lublin, Poland, elsami@biotop.umcs.lublin.pl

## Adrienne Kozan-Naumescu

Babes-Bolyai University Cluj, Romania, kozanadrienne@yahoo.com

## **Paul Pace**

University of Malta, Malta, paul.j.pace@um.edu.mt

## Kai Pata

University of Tartu, Estonia, pajulind@hotmail.co

## **Nicos Valanides**

University of Cyprus, Cyprus, nichri@ucy.ac.cy

### **Franz Bogner**

University of Bayreuth, Germany, Franz.Bogner@uni-bayreuth.de

## **Graça Carvalho**

IEC, University of Minho, Portugal, graca@iec.uminho.pt

### **ABSTRACT**

We analyze the conceptions of 4248 teachers on Environment and GMO (Genetically Modified Organisms), in 12 European countries: Cyprus, Estonia, Finland, France, Germany, Hungary, Italy, Lithuania, Malta, Poland, Portugal, Romania.

Most of the differences between teachers' conceptions are observed inside each country. Some of them (related to preservation or utilization of Environment) significantly differentiate the 12 countries. Biology teachers have more knowledge on GMO and more opinions pro-GMO than their colleagues. Female teachers are significantly more anti-GMO than their male colleagues. More a teacher studied at University, more he or she thinks that the resources of our planet are limited.

Keywords: Environmental Education, GMO, teachers, conceptions, values, Europe.

#### INTRODUCTION

The acceptance or reject of GMO (Genetically Modified Organisms) is a controversial issue in the European Community, with an opposition of divergent scientific arguments generally linked to different opinions (Berlan & Lewontin 1986, Kempf 2003, Bonneuil *et al.* 2008). These opinions are often rooted in philosophical points of view on Nature and on Environment, associated with divergent values (Schultz & Zelezny 1999, Clément 2004a, 2004b). In a broader way, the importance of values in science education is re-emerging (Corringan, Dillon & Gunstone 2007), and values are not exactly the same among the European countries (Galland & Lemel 2007). According to European Commission public opinion survey (Eurobarometer, 2008), the majority of Europeans are opposed to the use of GMOs (58%). At the country level the resistance is more important in some countries as Cyprus (82%) than in other ones as Malta (28%) or Portugal (28%).

What are the teachers' conceptions related to GMO in different European countries? Are their conceptions linked to their philosophy and attitudes on Nature and Environment? Are they linked to their scientific knowledge, or mainly to their values? Are there differences among countries, or among other teachers' characteristics (as their age, gender, level of instruction)?

## **METHODS**

Twelve European countries were chosen from their diversity, from North to South and East to West of Europe, from diverse economical levels and cultures, including differences among their religions: Cyprus, Estonia, Finland, France, Germany, Hungary, Italy, Lithuania, Malta, Poland, Portugal, Romania. In each country, six samples of about 50 teachers filled out a questionnaire: in-service teachers in primary schools (InP), in-service teachers in secondary schools teaching biology (InB) or language (InL); pre-service teachers for primary schools (PreP), pre-service teachers for secondary schools in biology (PreB) or language / letters (PreL); for a total of 4248 teachers in the 12 countries.

Each teacher filled out a questionnaire built by a collective work of the European research project Biohead-Citizen (Biology, Health and Environmental Education for better Citizenship, 2004-2008). Our theoretical basis and our methodology are described in other works (Caravita *et al.*, 2008; Clément & Carvalho, 2007). We used several precautions: a pilot test, interviews, avoiding bias in translation, etc. The final questionnaire (144 questions) included 29 questions related to Environment, 5 of them dealing with GMO. The teachers' answers were discussed using multivariate analyses (Munoz *et al.*, 2009): mainly PCA and between analyses completed by randomization tests (Monte Carlo type).

#### **RESULTS**

- \* The PCA (Principal Components Analysis) shows the main oppositions among the 4248 teachers' conceptions: the first one between the poles preservation and utilization of environment, with some link between preservation and anti-GMO opinions, and between utilization and pro-GMO opinions. The second opposition is related to the "feelings" of animals: being ecolocentric (pole preservation) or anthropocentric (pole utilization), a teacher can think that snails, flies and frogs are or not able to feel happiness. The third principal component is mainly defined by the 5 questions related to GMO, with a clear opposition between the pole anti-GMO and the pole pro-GMO.
- \* A between analyses shows that the teachers' conceptions differ very significantly (p < 0.001) among the 12 European countries, mainly from the questions related to preservation or utilization of Environment. For instance, more than 80% of teachers are, in Lithuania, confident with the society to solve even the biggest environmental problems, while this percentage is about 1/3 in Finland and Poland, but less than 10% in the other countries.
- \* An other between analysis shows that biology teachers (InB and PreB) have more scientific knowledge on GMO than their colleagues, and are also more pro-GMO.
- \* An other between analysis shows a significant gender effect, men being a little more pro-GMO than their female colleagues.
- \* We also found a significant effect of the teachers' level of qualification: more a teacher studied in University more he or she disagrees with the proposition "Our planet has unlimited natural resources".

## **CONCLUSIONS**

The controversial issue of GMO is only partly linked to other conceptions on Environment, and has some specificity. The differences among the countries are mainly related to teachers' values, their philosophy of Nature, utilization or preservation of Environment. The opposition between pro- and anti-GMO are found inside each country, with some significant correlations with the teachers' gender, their level of qualification, and the difference between the biology teachers and their colleagues. Finally, the teachers' opinions on GMO are less linked to their knowledge on the possible danger of GMO for environment than to a reject of too much biotechnology, as already suggested by de Chevigné (2004).

### **ACKNOWLEDGEMENTS**

This work has been supported by the European Research Project Biohead-Citizen (n° 506015, FP6, Priority 7: "Biology, Health and Environmental Education for better Citizenship").

#### **REFERENCES**

Berlan, J.-P. & Lewontin, R.C. (1986). Plant breeders' rights and the patenting of life forms. *Nature*, 322: 785-788.

Bonneuil, C., Joly, P.B., Marris, C. (2008). Disentrenching experiment? The construction of GM-crop field trials as a social problem. *Science, Technology and Human values*, 33 (2): 201-229.

Caravita, S., Valente, A, Luzi, D., Pace, P., Khalil, I., Berthou, G., Valanides, N., Kozan-Naumescu, A., Clément, P. (2008). Construction and validation of textbook analysis grids for ecology and environmental education. *Science Education International*, 19, 2, 97-116.

Clément, P. (2004a). Construction des umwelts et philosophies de la nature. in J.M.Exbrayat & P.Moreau, *L'homme méditerranéen et son environnement. Soc. Linéenne Lyon* (pp.93-106).

Clément, P. (2004b). Science et idéologie : exemples en didactique et épistémologie de la biologie. Actes du Colloque *Sciences, médias et société*. ENS-LSH, (pp.53-69) http://sciences-medias.ens-lsh.fr

Clément, P. & Carvalho, G. (2007). Biology, Health and Environmental Education for better Citizenship: teachers' conceptions and textbook analysis in 19 countries. *WCCES XIII (World Council of Comparative Education Societies*, Sarajevo, CD-Rom, 15 pp

Corringan, D., Dillon, J. & Gunstone, R. (2007). The re-emergence of values in science education. Rotterdam: Sense Publishers.

De Chevigné, S. (2004). L'opinion publique européenne et les biotechnologies. In M. Aligisakis (dir.), *L'Europe et les biotechnologies : urgences et impasses*. Ed. Euryopa, 24, p.118-134. Retrieved March 19, 2010 from http://www.unige.ch/ieug/publications/euryopa/aligisakiseuryopa.pdf

Eurobarometer (2008). Attitudes of European citizens towards the environment. *Special Eurobarometer 295/ Wave 68.2.* Retrieved March 19, 2010 from <a href="http://ec.europa.eu/public\_opinion/archives/ebs/ebs\_295\_en.pdf">http://ec.europa.eu/public\_opinion/archives/ebs/ebs\_295\_en.pdf</a>

Galland, O. & Lemel, Y. (2007). Valeurs et cultures en Europe. Paris: La Découverte, coll. Repères.

Kempf H. (2003). La guerre secrète des OGM. Paris: Seuil. 256 pp.

Munoz, F., F. Bogner, P. Clément & Carvalho, G. S.. 2009. Teachers' conceptions of nature and environment in 16 countries. *Journal of Environmental Psychology*, 29: 407-413.

Schultz, P.W., & Zelezny, L. (1999). Values as predictors of environmental attitudes: evidence for consistency across 14 countries. *Journal. of Environmental Psychology*, 19, 255-265.