



## Plantedirektoratet

### **Vedrørende spørgeskemaer fra SCAR Collaborative Working Group - Risk Research on Genetically Modified Organisms (CWG GMO)**

#### Fakultetssekretariatet

**Susanne Elmholt**

Koordinator for  
myndighedsrådgivning

Dato: 19. april 2010

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Afs. CVR-nr.: 31119103

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Plantedirektoratet har bedt Det Jordbrugsvidenskabelige Fakultet om at indsende oplysninger om projekter, der har relevans for ovennævnte arbejdsgruppe.

Oplysningerne er indsamlet af temakoordinator for Planter, seniorforsker Annie Enkegaard, til hvem evt. spørgsmål til besvarelsen kan rettes på tlf. 8999 3635.

Med venlig hilsen

Susanne Elmholt

**QUESTIONNAIRE**  
**on national research infrastructure & key topics concerning**  
**risk research on genetically modified organisms**

Name: Aarhus University, Faculty of Agricultural Sciences  
 Institution/Unit: Department of Agroecology and Environment  
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<b>General information on specific projects</b>	
Relevant timeframe: projects with an endpoint since 2004; running projects; future projects as far as details are already available	
<b>Project name:</b> <i>Soil ecological and economic evaluation of genetically modified crops.</i> <b>Project Acronym:</b> <i>Ecogen</i>	
18	<b>Project Leader/Management:</b> National Environmental Research Institute, Silkeborg  <b>Name, expertise:</b> Mathias Neumann Andersen, Senior scientist, plant molecular biology Institution/Unit: Aarhus University, Faculty of Agricultural Science (DJF), Dept. Agroecology and Environment; Telephone: +45 8999 1742; E-Mail: MathiasN.Andersen@agrsci.dk
19	<b>Project commissioned by:</b> EU-FP5
20	<b>Is the project part of a larger framework programme in your country?</b> No
21	<b>Existing co-operations:</b>
22	<b>Technical content of the project;</b> Impact on soil-living organisms; fodder value; chemical composition of Bt-maize, Basta-tolerant maize
23	<b>Overall Budget of the project:</b> DJF total 4 years: 2.239 000 DKK
24	<b>Duration of the project:</b> Start year: 2002 End year: 2005
25	<b>Website of the project:</b> www.Ecogen.dk
26	<b>Additional information material:</b> Special issue on the project in Pedobiologia 51 (2007) - doi:10.1016/j.pedobi.2007.03.005
27	<b>Additional remarks:</b>

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<b>General information on specific projects</b>	
Relevant timeframe: projects with an endpoint since 2004; running projects; future projects as far as details are already available	
<b>Project name:</b> <i>Drones of honey bees as indicators in ecological risk assessment of genetically modified plants</i>	
18	<b>Project Leader/Management:</b> Dr Henrik F. Brødsgaard, Senior scientist, entomology Aarhus University, Dep. Integrated Pest Management; Telephone: +45 8999 3500
19	<b>Project commissioned by:</b> Danish Agency for Science, Technology and Innovation
20	<b>Is the project part of a larger framework programme in your country?</b> No
21	<b>Existing co-operations:</b> Svalöf Weibull AB
22	<b>Technical content of the project:</b> The impact on honey bee larvae ( <i>Apis mellifera</i> ) of pollen from GM oil seed rape transgenic for a gene coding for lectin from pea.
23	<b>Overall Budget of the project:</b> Overall 201.000 EUR. Per year: 40268 EUR
24	<b>Duration of the project:</b> Start year: 2003 End year: 2005 (project was transferred to Swedish Agric.University 2 years before the end)
25	<b>Website of the project:</b>
26	<b>Additional information material:</b>
27	<b>Additional remarks:</b>

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<b>General information on specific projects</b>	
Relevant timeframe: projects with an endpoint since 2004; running projects; future projects as far as details are already available	
<b>Project name:</b> <i>Honeybees and genetically modified plants</i>	
18	<b>Project Leader/Management:</b> Dr Annie Enkegaard, Senior scientist, entomology Aarhus University, Dep. Integrated Pest Management; Telephone: +45 8999 3500; E-Mail: annie.enkegaard@agrsci.dk
19	<b>Project commissioned by:</b> Ministry of Food, Agriculture and Fisheries
20	<b>Is the project part of a larger framework programme in your country?</b> No
21	<b>Existing co-operations:</b>
22	<b>Technical content of the project:</b> Writing a review of co existence of honey bees and transgenic plants
23	<b>Overall Budget of the project:</b> Overall: 10.000 EUR
24	<b>Duration of the project:</b> Start year: 2009 End year: 2009
25	<b>Website of the project:</b>
26	<b>Additional information material:</b> <a href="http://www.agrsci.dk/djfpublikation/djfpdf/djfma141.pdf.pdf">http://www.agrsci.dk/djfpublikation/djfpdf/djfma141.pdf.pdf</a>
27	<b>Additional remarks:</b>

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<b>General information on specific projects</b>	
Relevant timeframe: projects with an endpoint since 2004; running projects; future projects as far as details are already available	
<b>Project name:</b> <i>Development and survival of a stored product pest, the maize weevil Sitophilus zeamais, and its parasitoid Lariophagus distinguendus, on dried GM-maize kernels</i>	
18	<b>Project Leader/Management:</b> Lise Stengård Hansen. Senior scientist, stored product pests Danish Institute of Agricultural Sciences; Danish Pest Infestation Laboratory Telephone: +45 89 99 39 00; Fax: +45 45 93 11 55; E-Mail: LiseS.Hansen@agrsci.dk
19	<b>Project commissioned by:</b> Danish Ministry of Food, Agriculture and Fisheries
20	<b>Is the project part of a larger framework programme in your country?</b> No
21	<b>Existing co-operations:</b>
22	<b>Technical content of the project:</b> The study investigated the effect of GMO-maize that produces <i>Bt</i> toxin to control insect pests in the field on the survival and fitness of an important pest of stored maize ( <i>Sitophilus zeamais</i> ) and its natural enemy, the parasitoid <i>Lariophagus distinguendus</i> .
23	<b>Overall Budget of the project:</b> Total budget €12,000
24	<b>Duration of the project:</b> Start year: 2006 End year: 2008
25	<b>Website of the project:</b>
26	<b>Additional information material:</b>
27	<b>Additional remarks:</b>

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<b>General information on specific projects</b>	
Relevant timeframe: projects with an endpoint since 2004; running projects; future projects as far as details are already available	
<b>Project name:</b> <i>Environmental risk assessment of GM crops</i>	
18	<b>Project Leader/Management:</b> Gabor Lövei, Senior Scientist Danish Institute of Agricultural Sciences; Department of Integrated Pest Management Telephone: +45 89 99 36 36; Fax: +45 89 99 35 01M; E-Mail: gabor.lovei@agrsci.dk
19	<b>Project commissioned by:</b> Self-financed
20	<b>Is the project part of a larger framework programme in your country?</b> No
21	<b>Existing co-operations:</b>
22	<b>Technical content of the project:</b> To improve the ecological realism of laboratory methods (the usual method only includes a prey and a natural enemy species), a semi-field, multi-species biosafety test system was developed.
23	<b>Overall Budget of the project:</b> Budget per year 350,000 DKK
24	<b>Duration of the project:</b> Start year: 2003 End year: 2006
25	<b>Website of the project:</b>
26	<b>Additional information material:</b>
27	<b>Additional remarks:</b>

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<b>General information on specific projects</b>	
Relevant timeframe: projects with an endpoint since 2004; running projects; future projects as far as details are already available	
<b>Project name:</b> <i>COTRAN: Assessment of the environmental and agronomic appropriateness of Bt transgenic cotton in small producer IPM system in China</i>	
18	<b>Project Leader/Management:</b> Gabor Lövei, Senior Scientist Danish Institute of Agricultural Sciences; Department of Integrated Pest Management Telephone: +45 89 99 36 36; Fax: +45 89 99 35 01; E-Mail: gabor.lovei@agrsci.dk
19	<b>Project commissioned by:</b> EU
20	<b>Is the project part of a larger framework programme in your country?</b> No
21	<b>Existing co-operations:</b> Chinese Academy of Agricultural Sciences
22	<b>Technical content of the project:</b> We were financial co-ordinator and partnered with the Chinese Academy of Agricultural Sciences' Institute for Biological Control to complete WP1: Laboratory studies of effects of Bt-transgenic cotton on non-target phytophages and natural enemies. We developed laboratory methods to evaluate the impact of GM cotton on natural enemies occurring in China, and produced a manual of methods on CD, published in English and Chinese. Further, more sophisticated methods (Rt-PCR) were pioneered and published in peer-reviewed international journal (in 2007).
23	<b>Overall Budget of the project:</b> Budget per year 250,000 DKK
24	<b>Duration of the project:</b> Start year: 2001 End year: 2005
25	<b>Website of the project:</b>
26	<b>Additional information material:</b>
27	<b>Additional remarks:</b>

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<b>General information on specific projects</b>	
Relevant timeframe: projects with an endpoint since 2004; running projects; future projects as far as details are already available	
<b>Project name:</b> <i>Spraying practice in crop rotations with and without glyphosate-tolerant crops: effects on the flora in fields and boundaries</i>	
18	<b>Project Leader/Management:</b> Niels Holst, Senior Scientist Danish Institute of Agricultural Sciences; Department of Integrated Pest Management Telephone: +45 89 99 35 91; Fax: +45 89 99 35 01; E-Mail: niels.holst@agrsci.dk
19	<b>Project commissioned by:</b> Danish Ministry of Environment
20	<b>Is the project part of a larger framework programme in your country?</b> No
21	<b>Existing co-operations:</b>
22	<b>Technical content of the project:</b> The introduction of genetically-modified, glyphosate-tolerant crops would likely alter the pattern of pesticide use in Danish agriculture, both in terms of herbicide choice and timing of treatments. This would change the living conditions for the flora and fauna in fields and field edges because of the change in herbicide exposure. In this project we investigated how the introduction of glyphosate-tolerant (GT) crops, winter oilseed rape, maize and beets, could affect the flora in fields and field edges. It was hypothesised that the delayed spraying, that GT crops make possible, can have positive effects on the flora. Experimental work in fields and uncultivated habitats was supported by mathematical modelling to predict the long-term effect of different cultivation scenarios. A sociological investigation early on in the project <sup>1</sup> provided a basis to define these scenarios. We conclude that, if just GT crops are grown in rotation with non-GT crops then this will prevent the evolution of glyphosate-tolerant weeds in the fields and of dominance by glyphosate-tolerant species in the field edges. But in fact Danish farmers are, with their current knowledge and attitude, most likely to combine glyphosate with other herbicides when growing GT crops, exactly to prevent the evolution of glyphosate-tolerant weeds. If the goal is to increase weed coverage in the early summer then GT crops will allow this at a lower increase in the treatment frequency index than conventional herbicides. However, in competitively weak crops, like maize and beet, much experimental work will be needed to define more precisely the possibilities for postponing the spraying in GT cultivars without compromising yields. An increased density of weeds in the field may increase the density of insects too – with derived, potentially positive effects higher up in the food chain. But it is not possible to predict the density of insects just from the density of weeds.
23	<b>Overall Budget of the project:</b> Budget per year 450,000 DKK
24	<b>Duration of the project:</b> Start year: 2004; End year: 2007
25	<b>Website of the project:</b>
26	<b>Additional information material:</b>
27	<b>Additional remarks:</b>



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<b>General information on specific projects</b>	
<b>Relevant timeframe:</b> projects with an endpoint since 2004; running projects; future projects as far as details are already available	
<b>Project name:</b> <i>BiosafeTrain: Capacity building for biosafety and ecological impact assessment of transgenic plants in East Africa</i>	
18	<b>Project Leader/Management:</b> Gabor Lövei, Senior Scientist Danish Institute of Agricultural Sciences; Department of Integrated Pest Management Telephone: +45 89 99 36 36; Fax: +45 89 99 35 01; E-Mail: <a href="mailto:gabor.lovei@agrsci.dk">gabor.lovei@agrsci.dk</a>
19	<b>Project commissioned by:</b> Danida
20	<b>Is the project part of a larger framework programme in your country?</b> Yes - ENRECA (Enhancement of research capacity in developing countries)
21	<b>Existing co-operations:</b> University of Dar es Salaam, Tanzania University of Nairobi, School of Biological Sciences, Kenya Kenya Agricultural Research Institute Makerere University, Department of Crop Science, Uganda
22	<b>Technical content of the project:</b>  GM crops. See description below (BiosafeTrain).
23	<b>Overall Budget of the project:</b> Budget per year 2,700,000 DKK
24	<b>Duration of the project:</b> Start year: 2005 End year: 2016 (if extension is approved in 2010 and again in 2013)
25	<b>Website of the project:</b> <a href="http://www.biosafetrain.dk">www.biosafetrain.dk</a>
26	<b>Additional information material:</b>
27	<b>Additional remarks:</b>

## BiosafeTrain: Biosafety of genetically modified crops in East Africa

### Overall objective

The overall objective is to enable East African partner countries to make well-informed decisions regarding the adoption and management of GM crops.

### Intermediate objectives

The intermediate objective to achieve the above is to have GM biosafety/impact assessment capacity and personnel established in Uganda, Kenya & Tanzania.

### Output of project

The main outputs of the project will be: (1) personnel trained in GM biosafety methods, together with (2) appropriate training, (3) research, and (4) containment facilities with (5) operation protocols. These will all be appropriately equipped, the necessary protocols established to international standards, so that they can (6) generate the necessary knowledge to achieve the main objective. Further, we will (7) continue discussion on societal & ethical concerns, so that these enter the discussion during the adoption of transgenic crops in the region. Our aim is also to make sure that (8) the existing guidelines are applied, tested, and modified to the region as necessary, leading to (9) improved guidelines and thus improved biosafety in East Africa.

### Project input and activities

To generate the above outputs, the following activities are foreseen in Phase3 :

1. *Student & technician training:* We will continue our MSc/PhD fellowship program, but at lower intensity. Several current students will only graduate during 2010-2012, and we would like to make sure these yield high-quality Theses. Additionally, we intend to support technician training (2 longer attachments and 3 short training courses for technicians) to ensure having experienced personnel working in the new facilities. The student research projects will include ecology, gene flow, agricultural management/monitoring, and coexistence of GM and conventional crops. Co-supervision will be provided from Denmark. The crops involved will be cotton, maize, rice and cassava, all subject to regional GM projects, and important crops in the region. Appropriate research projects will be formulated, research executed, results analysed, evaluated, published and incorporated into risk assessment procedure. (see timeline in Appendix).

2. The completion of the *infrastructural facilities* built during Phases1&2 suffered a delay due to budget constraints, and are to be equipped: a research laboratory and attached biosafety-level glasshouse in Tanzania, the Arthropod Quarantine Facility in Uganda, and the GM detection laboratory in Kenya. To equip training facility at the University of Nairobi, we shall develop and adapt relevant protocols, making it a GM detection laboratory, belonging to the laboratory network by Genetic ID, a company specialising in GM detection (we have a working relationship, they provided principles of design, list of equipment and chemicals, etc.). The Quarantine Facility will be developed in collaboration with *icipe*, Nairobi (see Appendix), to make the facility operational and to provide training and continued technical assistance in aspects where our core team lacks experience.

3. *Training.* Min. 3 specialist training courses will be held for our students. For these, we shall utilise the facilities developed in Phases 1&2 (see above). Additionally, short courses will be held either by collaboration with other organisations (see letters of intent in Appendix), or according to requests from stakeholders (see relevant letters from such organisations), at least 60 people in three years. Such training will be provided by the core supervision team, both from Denmark and Africa. Additionally, we provide input into regional and continental training courses. Three annual student workshops will be held for our students. Budget constraints have prevented the involvement of CeBra, Univ. Copenhagen's Center for Bioethics, during Phase2. We intend to re-engage them so that ethical aspects are not forgotten during training.

### Effects of the project

One core concern for Danish developmental assistance is the concern for the environment, so that development does not foreclose options for future generations in the use of natural resources. Biosafety of GM crops, the topic of this proposal, fits eminently with this goal. An important element is also to assist developing countries to respond to challenges of globalisation. All currently available GM crops are developed by multinationals – thus this area falls under the effects of globalisation, and the international legislation concerning transgenic organisms, the Cartagena Protocol, poses further special challenges for developing countries. The current project provides internationally recognised

assistance in the above important elements of Danish development assistance. The capacity developed by the project will also enable the partner countries to capture the maximum benefits from adopting GM crops to increase food security. There is a need for visibility on the project activities to stakeholders- scientists and the mass media. Our activities have already attracted the attention of the media, and several stakeholders approached us to collaborate with us to biosafety education of their constituents (from national environmental authorities, farmers' organisations, and continent-wide organisations – see letters in Appendix).

Biotechnology and biosafety capacity building is a common priority for all three partner countries that see this as a tool to increase food security and reduce poverty. Kenya now has a biosafety law (2008), Tanzania since end of 2009 has an effective regulatory framework (F.Ismail, pers. comm., Mar 2010) and Uganda has also tabled it in their Parliament. Our project contributes to capacity building in biosafety that is seen as essential in the successful adoption of GM crops in Africa.

### **Theoretical and methodological frame for the research**

Biosafety is a prime concern for signatories of the Cartagena Protocol, which calls for event- and environment- specific risk assessment. This is a special challenge in African countries, due to a prevalence of small-scale agriculture, a lack of capacity and significant information gaps. These can be filled with local capacity development, thus our approach is to have all research and training in the partner region. Our aim is to improve GMO biosafety/ecological risk assessment knowledge and practice in East Africa by:

- Developing a research agenda adapted to local conditions on relevant biosafety topics. Generating new knowledge realising this agenda
- Offering M.Sc. and Ph.D.-level educational training on agricultural and environmental impacts of GM plants, with joint supervision with the relevant local university/institute (University of Nairobi, KARI, Makerere University, University of Dar es Salaam) and performing projects decided on and carried out locally.
- Organising an international training program, specialising in different aspects in the different partner countries, thus encouraging regional co-operation.
- Renovating/ building necessary infrastructure to realise the planned research and training agenda.
- Organising training for technicians who will work in the newly developed facilities
- During the process of student work, training and procedure developments, we will also test and revise suggested standard procedures for GM biosafety

### **Status of existing knowledge in the field (state-of-the-art) and innovative value of the proposed research**

Biosafety is recognised as a vital element in adopting GM crops in general. It is also recognised (and codified in the Cartagena Protocol) that the receiving environment has to be specifically considered. The list below is a short summary of projects in preparation of transgenic crops in the area.

**Cotton.** In East Africa, transgenic Bt cotton is being considered for introduction as part of government strategy for the revival of the collapsed cotton industry. The first greenhouse and confined field trials were in Kenya at our partner, Kenya Agricultural Research Institute. Since then trials are running in Uganda, and planned for Tanzania.

**Maize.** The Water Efficient Maize for Africa (WEMA) is a private-public sector initiative led by Africa Agricultural Technology Foundation (AATF). The aim is to develop drought tolerant maize lines using transgenes supplied by Monsanto. Other partners include the National Agricultural research systems in Kenya, Uganda, Tanzania, South Africa and CIMMYT. The project started in 2009 and will run for 5 years. The long-running IRAM (Insect-resistant Maize for Africa) project is also running, albeit slowly.

**Cassava.** The virus resistant cassava for Africa (VIRCA) project is based on research partnerships between Donald Danforth Plant Science Center (DDPSC) and African countries (currently Kenya, Uganda and Malawi). Research is on-going to develop transgenic versions of farmer-preferred cassava varieties, retaining their desirable agronomic and processing qualities and with resistance to CMD.

Other projects include a bacterial wilt disease –resistant **banana** (field trial in Uganda).

Given the political will, and the commercial background, most efforts concentrate on the development of new and relevant GM crops for Africa. Biosafety concerns are important but not supported by multinational companies that often aim to introduce their GM crops quickly. Our proposed project will help in risk assessment of the above named GM crops before introduction. A GMO detection lab is necessary to monitor imports at the port of entry. The lab will also help detect presence/absence of transgenic gens in agricultural produce in Kenya. The issue of contamination is critical.

The *innovative value* of the project lies in the following:

- most activities take place in the target countries, only a few meetings and limited student stays are in Denmark
- it integrates the development of infrastructure, specialist training and stakeholder training
- the infrastructure is not single-purpose, ensuring multiple use according to the partner needs (research as well as teaching, teaching or commercial application potential – GM detection lab)
- it places emphasis on communication by employing a local communications officer

The innovative value of the project was acknowledged internationally: in 2008, the project was selected as one of the ten most innovative agricultural development projects in Africa, and showcased at a World Bank-sponsored meeting (see enclosed output list).

### **Details of the applicant's qualifications and previous contributions to the field**

GL has worked in GM risk assessment since 1994. Initiating the research area in New Zealand, he has been active in Europe from 1998, leading several projects in Denmark, China and Africa. He has been PI of BiosafeTrain since its start. In the GM risk assessment area, he has published 33 papers/book chapters, and held 156 presentations world-wide, including plenary talks, and invited seminars. He has organised 5 special symposia on GM in international conferences, has been invited expert to EFSA on GM risk assessment methodology, is a member of advisory committees of the Bavarian Min. of Science & Technology, the Hungarian Acad. of Sciences, and reviewer for several research projects and funding organisations.

**Kenya Agricultural Research Institute (KARI)**, the main national agricultural research institution in Kenya, has 29 research centres in the country. KARI has the basic infrastructural facilities for studies of transgenic crops, including laboratory and field facilities. All have been accredited by the National Biosafety Committee (NBC). KARI is the official state institute for GM crops pre-release testing. Currently, one PhD student Hannha Kariuki is now working on a biosafety-related project, our Tanzanian PhD student J. Swilla is doing field work there, plus one MSc student (Nehemiah Ngetich) from U.NBO. Participating scientists: Dr. Ruth Amata, Plant Pathologist, Dr. Muo Casina, entomologist (CVs in Appendix).

The **University of Nairobi** was founded in 1958 as the Royal College, and today trains 5,000 new graduates/year in basic sciences, engineering, medicine, agriculture, liberal arts, etc. The University carries out research in biotechnology, and has wide experience in carrying out and managing large international research projects. Our co-operating partner is in The School of Biological and Physical Sciences on Chiromo Campus. A GM training and research laboratory, as part of the BiosafeTrain project support, was completed in 2007. Will organise & host training courses in biosafety and host/supervise 1 PhD and 2MSc students specialising in biosafety. Persons involved: Prof. Jenesis Kinyamario, Dr. Nelson Amugune, Dr. Samuel Kiboi (CVs in Appendix).

The Faculty of Agriculture at **Makerere University**, Uganda has two operational laboratories to conduct biotechnology research and training, at the main campus and at the agricultural research station at Kabanyolo for tissue and cell culture. This makes Makerere University a major player for biotechnology research and capacity development in Uganda. The staff have participated in the drafting of the biotechnology and biosafety policy for Uganda and one member sits in the National Biosafety Committee. BiosafeTrain funded the establishment of a biosafety/quarantine laboratory at Kabanyolo Campus, which has a commitment of continued support from the university (staff, running costs). This partner will organise training in biosafety and host/supervise 1 PhD and 1MSc student. Personnel involved: Dr. Richard Edema, Dr. Jennifer Bisikwa (see CVs in Appendix)

At the **University of Dar es Salaam**, Tanzania, we continue to co-operate with the Departments of Botany, and Biotechnology & Molecular Biology. The departments are involved in biosafety and risk assessment research and have one of the most advanced laboratories in the country to undertake molecular biology and DNA analysis. A special GM research lab and glasshouse is now being equipped as part of Phase3. Will provide training and host/supervise 1 PhD and 1 MSc students.

Participating scientists: Dr. Flora Ismail, Lecturer, Head of Dept of Botany, Dr. Sylvester Lyangtagaye (Biotechnology) (CVs in Appendix).

### Partners in Denmark

Phase 1 has proven that the involvement of Danish research groups is useful to build capacity in developing countries to do impact assessment of biotechnology. The participating groups have expertise in such research, have performed actual impact assessment of GM crops in Denmark and elsewhere, and are active in international initiatives. Recent activities in Denmark to deal with the coexistence of GM with non-GM and organic crops are at the front of such activities within the EU. Finally, Denmark has a good tradition with science based management and administration in the regulation of biotechnological products.

**Aarhus University**, Dept Integrated Pest Mgmt (formerly DIAS) will be the overall project co-ordinator. It has a long track record in activities in the developing countries, with several international projects in Africa, Central America and Asia. The persons involved have long record in such activities, including GMO risk assessment. The Department has appropriate facilities to support experimental work with GMO – even if most of such activity under this project will take place in Africa. The Dept will provide input into all aspects of the project. Personnel involved. Senior Scientists G. L. Lövei (overall co-ordinator), N. Holst (CVs in Appendix).

From the **Univ. Copenhagen**, three groups will be involved: the KU.-LIFE Dept of Ecology (T. Hauser), the Centre for Bioethics and Risk Assessment (M.Gjerris) and the Inst. Biology (F.Ekelund). All have long experience in working with both relevant aspects of biotechnology as well as projects in the developing countries. These units will contribute to teaching relevant courses, supervising students and providing GM plant material and additional technological assistance. (CVs in Appendix)

### Work schedule and time schedule, incl. milestones

See enclosed as Appendices. Below only the main outputs/indicators are listed:

#### Indicators for measuring outputs

- During Phase2, a further 7 M.Sc. and 3 Ph.D. students trained (theses)
- 4 additional short training workshops held, training material in use in Africa (African Union-organised biosafety courses documented), min. 60 people trained
- Biosafety Training Laboratories in Kenya and Tanzania are equipped and operational; biosafety facility for arthropod biocontainment-level is equipped in Uganda (certificates of operation issued by relevant authorities). Trained technicians are also available and employed at the facilities (by the partners)
- The BiosafeTrain Project Website ([www.biosafetrain.dk](http://www.biosafetrain.dk)) is regularly updated
- International publications - we expect that there will be at least one peer-reviewed paper from every thesis (i.e. minimum of 10 peer-reviewed papers)
- Additional 10 conference presentations at national/international conferences (during the first 2 phases, we made 63 such presentations) – (conference abstract publications)
- Information leaflets produced and updated yearly, also in Swahili (deposited in project archive, available on the project website)
- Newsletter - 4-monthly Project Newsletter published on the Internet (also on website and in project archive)
- project activities appear in electronic media/archives

### Project organisation

The project co-ordination mechanism established earlier works smoothly and will be kept. The Univ. Aarhus Dept. Integrated Pest Management will continue to be in charge of all contacts with DANIDA and will have the overall responsibility for management and progress of the project. The overall co-ordinator (G. Lövei) will manage the project, run the administrative procedures of the project, and co-ordinate the meetings of the Steering Committee (SC). We now involve two, not one co-ordinator from each African partner, to ensure continuity in case of career change or occasional conflict with other tasks.

The SC is composed of the

Project & overall co-ordinator, Dr. G. L. Lövei; Project co-leader & university training co-ordinator, Prof. J. Kinyamario; two scientific secretaries: Dr. N. Holst & R. Amata; training co-ordinators: Dr. F. Ismail & T. Hauser; a research capacity co-ordinator: Dr. R. Edema; a financial co-ordinator: B. Møller, a communications manager: J. Owango and external advisor I. Fomsgaard (Aarhus Univ.)



The SC is to develop scientific strategies and priorities between and within the tasks, establish close and mutually profitable collaboration between the participating laboratories and provide scientific and budgetary information to the project co-ordinator. The SC decides on when and how to disseminate results. The full SC meets twice a year (once during a training course), the Danish SC members meet every 3 months. The African SC members will meet at least once every year. Frequent contacts (telephone, e-mails, visits, meetings) between the partners worked well during Phase1 and will be continued. New means of electronic communication will be utilised in Phase3

*Financial management* will be provided by the main applicant, University of Aarhus. The budget will be allocated as the partners mutually agree. This will be declared in a detailed co-operation agreement. All partners will be managing their own budget, and report to AU. All African partners have experience in managing projects involving outside, foreign grants, and the necessary experience and organisation is available. The Steering Committee will periodically review and approve the financial management of the project.

All African partners are fully involved in planning. Infrastructural developments are suggested by the local partners who also oversee their completion. The students are exclusively selected by the partner institutions – the Danish partners provide co-supervision but do not take part in selecting the candidates. All project decisions are taken by the Steering Committee, where all partners are equally represented. We have found that if a partner is represented by a single person (the main contact point to that partner), it may make the project vulnerable, so now there is a stand-in person for every partner, who is in full knowledge of progress and can act as substitute for the main contact.

### **Risks and assumptions**

At the beginning of Phase 1, we stated that the *most important assumption* is that the governments in East Africa continue to recognise the *importance of biosafety/reliable risk assessment procedures* in the process of adopting GM plants. This assumption still holds. Kenya has a Biosafety Bill (2009), and the other two countries have draft laws. One of our now-running PhD project topics (H. Karuri, KARI, on soil ecology of Bt-cotton) was stated by the Kenyan regulatory organisation, KEPHIS, as a condition of possible approval of Bt-cotton in Kenya (R. Amata, KARI, pers. comm. 2010).

Another assumption was that output from other projects (e.g. GMO-ERA) is available. Our continued involvement in international activities ensures this access. We have now been involved in training at African level, and built collaboration with ICGEB, CBD, the African Union (see letters in Appendix).

The *risk of project overlap* has further decreased as BiosafeTrain is more embedded in international and continent-wide training activities. It still is one of the key initiatives in the region. The USAID-supported biosafety program, PRS, remains active, but in spite of considerable publicity, it has limited resources devoted to capacity building, and channels such activity through US academic involvement. GenØk (Norway) has started collaboration with Zambia, giving biosafety training once a year. The Swiss-funded GMO-ERA (see: [www.gmo-guidelines.info](http://www.gmo-guidelines.info)) project is now active only in South America. Interest in biosafety remains high, and training needs are repeated at international meetings of the CBD (latest in Tsukuba, Japan, in February 2010, where BiosafeTrain was represented).

### **Information on how the project's findings are to be made public disseminated and communicated**

The dissemination of results is (since Dec 2006) aided by a local (Kenyan) Communications Manager, and has two aspects:

*Within-team*, the 3-monthly periodic reports on progress, both by partners and students, will continue to be circulated. Every 6 months, each student is required to submit a more detailed report to the Steering Committee. All copies of manuscripts, reports, and theses are circulated before submission or publication. An internal website is active, containing all documents, reports, etc. (formerly at CampusNet of KVL, now in transition to Aarhus University's Net-based forum AULA). This provides smooth information flow among the partners.

*Outside the team*, the following vehicles provide information at the different levels:

- a freely accessible project website: [www.biosafetrain.dk](http://www.biosafetrain.dk) (operational since late Phase1, 2007 and regularly updated)
- the electronic project newsletter is published three times yearly. Sent to institutes, university councils, members of the scientific community, the IOBC GM Working Group and is also freely available at our website
- general publications/leaflets continue to be produced on selected topics, aimed at non-expert stakeholders

- training courses /workshops continue to be held for stakeholders according to need (see stakeholder letters enclosed)
- scientific publications, lectures, posters at national and international conferences will make public the scientific results of the project
- a special biosafety conference to be organised in late 2012, devoted to GM biosafety in Africa. This will also showcase our achievements over the three phases
- input provided for existing public discussion and for stakeholder organisations (e.g. ABSF – African Biotech Stakeholders' Forum, BioAWARE Kenya)
- teaching material in electronic forms (currently at: [www.gmoera.umn.edu](http://www.gmoera.umn.edu))
- engagement with training activities and planning in capacity building in co-operation with the CBD Secretariat, Montreal, African Union, and other stakeholders (see letters in Appendix)

### Description of any ethical aspects

GM crops are subject to special international legislation (Cartagena Protocol). Our experiments comply with the regulations of the partner countries, and this aspect will be adhered to in the future. In our training program, the involvement of UC CeBRA ensures that we put emphasis on ethical aspect also in training, not only in our research.

### Summary of the achievements of possible previous phases/projects.

Details are in the enclosed reports in the Appendix.

During Phases 1 (Dec 2004 – Nov 2007) & 2 (Dec 2007-to date), we have:

- constructed 4 biosafety facilities
- trained 2 PhD and 6 MSc students in biosafety (further 2 PhD and 6 MScs are in training)
- held 5 courses in Africa, 1 workshop in Denmark, contributed to 3 others, held 66 presentations, published 20 scientific papers and book chapters
- disseminated our results to stakeholders via a website, 9 issues of newsletter, press releases, articles in popular press, radio programs, radio & TV interviews.
- collaborated with national (Kenyan Min. Agriculture, Cotton Growers Assoc, Uganda), regional (ASARECA) and international (CBD, UNEP GEF, African Union) stakeholders to increase awareness about biosafety as an element of adopting GM crops

The project has achieved the distinction of (one of ten selected) "Innovative Agricultural Development Project in Africa", organised by the World Bank, and the governments of Tanzania, Denmark and Norway (April 2008).

### Need and relevance for the project output for Danish development assistance

Output from this project supports several core elements for Danish developmental assistance:

- *integrate the environmental issue* in all aspects of development
- support the efforts of the developing countries to show concern for the environment in the development process by *building the capacity* of central and local government in matters related to GM crops
- support the *sustainable administration of natural resources*, and promote the development of economic and other incentives for the sound administration of natural resources in primary and processing industries
- support the *international co-operation* aimed at formulating rules and standards for the environment and development, and
- support the *ability and capacity of the developing countries to participate in international negotiations* in the field of the environment and to *implement international agreements on the environment and development* nationally – The international legislation concerning transgenic organisms, the Cartagena Protocol, to which most African countries are signatories (39 of the 52 African countries) poses further special challenges for developing countries. BiosafeTrain provides capacity to enable the partner countries to fulfill their obligations under the Cartagena Protocol. BiosafeTrain partners have regularly been attending and providing input into the CBD Biosafety Capacity Building Co-ordination Meetings (latest in February 2010, Tsukuba, Japan)

The current project provides internationally recognised assistance in the above important elements of Danish development assistance. The capacity developed by the project will also enable the partner countries to capture the maximum benefits from adopting GM crops to increase food security and alleviate poverty, two important priorities in the Millennium Development Goals.

Compliance with partner country strategies for research prioritisation and strategies for development and poverty reduction

Kenya's Economic Recover Strategy, accepted in 2003 (reviewed in 2005, see [www.nesc.go.ke/Meetings/publications/iper2004-05mayreport.pdf](http://www.nesc.go.ke/Meetings/publications/iper2004-05mayreport.pdf)), indicates diversification of agricultural production, boosting of production of alternative crops (including cassava) as well as coping with challenges to increase yields in general and the profitability of agriculture, and to improve water use efficiency. GM crops can provide one possibility to contribute to these goals, at the same time the adoption of these crops has to follow a special procedure for which the country is still ill equipped. The Ugandan Poverty Eradication Action Plan (revision 2004, Ch4, pp.7-8) states that agricultural research and development should "incorporate socio-economic and poverty concerns ... incorporate environmental concerns, especially soil fertility, into NARS research" (material obtained from W. Thomson, then-DANIDA Chief Adviser, Uganda, March 2007). Adopting GM crops addresses both of these types of concerns.

A meeting of the agriculture ministers of the African Union (in 2006) noted that the adoption of GM crops still lags behind that of the developed countries by ca. 10-15 years (Eicher & al. Food Policy 31, 504. 2006). Responding to African agriculture experts meeting during the third Conference of AU Ministers of Agriculture, in February 2007, several countries now have put in place a biosafety framework (including Kenya, 2008, and Tanzania 2009) in order to harness the potential from biotechnology. Most African countries being signatory parties to the Cartagena Protocol on Biosafety, they also have an obligation to have proper biosafety regulatory systems.

### **Sustainability**

This aspect is central to the project: all activities take place in Africa. The students are enrolled at local universities, often getting leave from their workplace, to which they return after the training (2). Others have been employed by the parent university (1), country research organisation (1), local NGO (1) or international organisations (2). The infrastructure is designed to be multi-purpose and partially supported by the hosting institution. The training is increasingly done by the African partners, who are now regularly invited to intra-African (international) training courses as resource persons. Several of the partner scientists are now members of their national biosafety organisations, and provide expert advice at international level (CBD meetings). Additionally, training is increasingly done in collaboration with other organisations, widening the impact and providing extra sustainability.