

# LU·BI·LO·SA 3

## The Newsletter of Phase 3 of the LUBILOSA Programme LUBILOSA - Lutte Biologique contre les Locustes et Sauteriaux The Biological Control of Locusts & Grasshoppers

Issue No. 5 March 1998

### WELCOME

Welcome to the fifth issue of LUBILOSA 3. This quarter has involved the LUBILOSA team in a wide range of activities including a new submission to the FAO Pesticides Referee Group and the Programme Management Committee (PMC) meeting held on 10-12 December 1997 in Eschborn, Germany. The PMC was hosted by the GTZ team and was a great success, not least because of the diligence, organisation and enthusiasm of our GTZ colleagues. I would like to thank on behalf of all the participants, Stephan Krall and his team for all their hard work and for making the event such a great success. The PMC was also a success due to the significant input from Dr Paul Wellings (Head of Division, Science and Technology Division, Australia), Expert Advisory Committee Chairman, who assisted in keeping our minds clearly focused on the need to ensure that the LUBILOSA mycoinsecticide successfully reached its beneficiaries, through careful understanding of our position on commercialisation and intellectual property rights (IPR).

The issue of IPR was considered at length and the PMC agreed that LUBILOSA should produce a Position Statement on IPR and Benefit Sharing for consideration by the donors and partner organisations. This document is available to LUBILOSA partners on request and a summary is included in this edition of the newsletter for more general information. The issue of IPR and benefit sharing will be discussed by LUBILOSA partners at their meeting in Niamey, Niger, at the end of April.

The LUBILOSA programme looks forward to the Green Muscle workshop in Pretoria, South Africa, on the 24 March. The workshop has been organised by LUBILOSA and Biological Control Products (BCP), the company in South Africa who will be producing, marketing and selling Green Muscle, the *Metarhizium* mycoinsecticide, for the Brown Locust market in South Africa. The workshop will bring together representatives of LUBILOSA, BCP, the Department of Agriculture and Land Affairs, the Agricultural Research Council Plant Protection Research Institute, donor agencies and the media to hear about the problems of locust control and the potential of Green Muscle as a biological control agent. Further details about BCP, LUBILOSA's collaboration with PPRI and the Green Muscle workshop are presented in this edition of the newsletter.

LUBILOSA is funded by the Governments of Canada (CIDA; Canadian International Development Agency), Switzerland (SDC; Swiss Development Cooperation), the Netherlands (DGIS; Directorate General for International Cooperation) and the UK (DfID; Department for International Development).

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# 15th PMC MEETING

The 15<sup>th</sup> meeting of the LUBILOSA Programme Management Committee (PMC) took place on 10 - 12 December 1997 at the GTZ Headquarters in Eschborn, Germany. The meeting was chaired by Dr Peter Neuenschwander (Director PHMD at IITA). The other attending members of the committee were Dr Chris Lomer (LUBILOSA Programme Leader, IITA), Dr Jeff Waage (Director BPM, CABI BIOSCIENCE), Dr David Dent (LUBILOSA Programme Manager, CABI BIOSCIENCE) and Dr Stephan Krall (GTZ). Also present at the meeting were: representatives from LUBILOSA's donor Government organisations of Canada (Mr Réjean Forget and Mr Roger Benjamin, CIDA), Switzerland (Dr Philippe Zahner, SDC) and the UK (Mr H Dobson, technical advisor to DfID); Dr Paul Wellings (Head of Division, Science and Technology Division, Australia), Chairman of the Expert Advisory Committee (EAC); and the LUBILOSA scientists Dr Roy Bateman (application specialist, CABI BIOSCIENCE) and Dr Hugo de Groot (socio-economist, IITA). Apologies were received from the CILSS and DGIS representatives who were unable to attend the meeting.

The meeting was an opportunity for the PMC to meet with the donor representatives to review the progress of the LUBILOSA Programme and discuss the programme's future work priorities. The agenda for the meeting included a programme review from the Programme Leader with discussions on improvements in spore production and successful field trials and ecotoxicology research. The report from the Programme Manager highlighted the significant advances that had been made since the last PMC meeting in removing the barriers to the commercialisation of the LUBILOSA mycoinsecticide. Paul Wellings presented the report of the EAC meeting in September 1997 and the action which had been taken so far to fulfil the EAC recommendations dealing with technical, socio-economic, commercial and programme management issues were discussed. Hugo de Groot presented a paper on the socio-economic analysis of the potential for pesticide use in Africa comprising a cost benefit analysis, participatory research and socio-economic studies; all valuable information for commercialisation. Also discussed was the issue of intellectual property rights and towards the end of the meeting, Roy Bateman opened a discussion on the issue of strains and isolates, on which an article appear in the next newsletter.

## INTELLECTUAL PROPERTY RIGHTS

The LUBILOSA mycoinsecticide technology is now available for dissemination. The means by which the needs of the largest possible constituency for this technology can be met, is judged to be through the process of commercialisation. At present, two commercial companies are prepared to invest in the technology to produce, market and sell the mycoinsecticide. The process of commercialisation raises issues of intellectual property rights, responsibilities for transfer of the technology and benefit sharing.

The issues of intellectual property rights and technology transfer were addressed at the PMC and it was proposed that a Position Statement be produced to clarify the position with regard to intellectual property rights and benefit sharing for the LUBILOSA donors, partners and collaborators.

The position statement has now been completed and

commented on by the LUBILOSA donors. The Position Statement has the following objectives:

- LUBILOSA seeks to ensure that the benefit which will arise from the use of the mycoinsecticide reaches as large a constituency as possible within Africa.
- LUBILOSA seeks to ensure that the benefits which may arise from the commercialisation and sale of the mycoinsecticide are distributed equitably among those who contributed to its development.

The Position Statement includes sections on the following: the route to dissemination and technology transfer; ownership of the technology (including public information, CABI management of LUBILOSA, origin and distribution of the LUBILOSA strain IMI 330189, oil formulation technology, donor positions and implications of donor positions); benefit sharing: a trust fund; and finally action required by the donors.

The benefits arising from the development of the mycoinsecticide can be described as:

- access to the technology and benefits that accrue from its use;
- capacity building through the LUBILOSA training programme;
- royalties generated from the sale of the mycoinsecticide.

Royalties will be generated by the sale of the mycoinsecticide but the amounts of money generated are unlikely to be large. If these royalties are split between all the agencies and organisations involved in the LUBILOSA programme, then the amount paid to each will be insignificant and of little practical value. For this reason, it is proposed that the monies generated from royalties on the sale of the mycoinsecticide in Africa be accrued in a trust fund. A LUBILOSA Trust Fund would be managed to the benefit of all participating and contributing organisations involved in the development of the mycoinsecticide through funding of collaborative research and implementation initiatives associated with promoting biopesticide development and use in Africa.

There are many models for establishing and managing trust funds. These models will be reviewed and the most appropriate options for establishing and managing a LUBILOSA Trust Fund will be presented for consideration by the donors and LUBILOSA partners at PMC 16, October 1998. The trust fund will be established and managed taking into account and working within the principles established by the Convention on Biological Diversity.

Copies of the position statement are available upon request to LUBILOSA partners.

### LUBILOSA - THE MOVIE

*The LUBILOSA story has been encapsulated in a very short film sponsored by the UK Foreign and Commonwealth Office. In the four minutes that make up the film (which goes out under the series called Perspective Plus), LUBILOSA is briefly considered in terms of its work in developing the oil formulation of the fungus and its production, extraction and application. Scenes are included that were filmed by Roy Bateman during recent field trials in Niger. Perspective Plus will be broadcast all over the world in the coming months.*

## R&D TO COMMERCIALISATION

The value of good collaboration is epitomised by that between the Plant Protection Research Institute (PPRI) in South Africa and LUBILOSA. The relationship was initiated with a visit by Roger Price in 1993 to IIBC, Ascot. Considerable common interests were identified and the visit was quickly followed up by the first trials against the Brown Locust in the Karoo using *Metarhizium* in 1994. The first aerial trial was conducted in 1995 and subsequent trials in 1997 and 1998. The successful outcome of this research has been summarised in two publications (Bateman et al, 1994; Price et al 1997). In addition, PPRI have undertaken a series of ecotoxicological trials in collaboration with LUBILOSA and have provided a constant reliable source of information and contacts. Perhaps the most significant of these was the introduction of LUBILOSA to Dr Diane Neethling, Managing Director of Biological Control Products



S.A. (Pty) Ltd. The core business of BCP is in the manufacturing, marketing and selling of biological control agents, primarily in control of plant pathogens. They have registered their first product PL Plus, based on the fungus *Paecilomyces lilacinus*, for use in nematode control in South Africa. In discussions with Elizabeth Müller (PPRI), Dr Neethling was made aware of the LUBILOSA programme and

the potential of Green Muscle for locust and grasshopper control. This led to a meeting with LUBILOSA scientists, since which time BCP have collaborated in production trials, taken responsibility for registration of Green Muscle in South Africa and entered into licensing agreements with CABI on behalf of LUBILOSA. All of this has led to the Green Muscle Workshop in Pretoria on 24 March. LUBILOSA looks forward to a continuing and prosperous collaboration with PPRI and BCP!



### References

Bateman, R.P., Price, R.F., Müller, E.J. and Brown, H.D. (1994) Controlling brown locust hopper bands in South Africa with a mycoinsecticide spray. Brighton Crop Protection Conference - Pests & Diseases, 6A-3, 609-616.

Price, R.E., Bateman, R.P., Brown, H.D., Butler, E.T. and Müller, E.J. (1997) Aerial spray trials against brown locust (*Locustana pardalina*, Walker) nymphs in South Africa using oil-based formulations of *Metarhizium flavoviride*. *Crop Protection*, **16**, 345-351.

## NEWS IN BRIEF

Biological Control Products is named as the company in South Africa who will be producing, marketing and selling "Green Muscle", the *Metarhizium* mycoinsecticide developed by LUBILOSA.

A Green Muscle workshop will take place on 24 March 1998 in South Africa, with presentations by LUBILOSA, BCP and PPRI about the problems of locust control and the potential of Green Muscle as a biological control agent.

A second submission is made to the FAO Desert Locust Pesticide Referee Group for wider consideration of the use of the LUBILOSA mycoinsecticide with additional data on efficacy and ecotoxicology.

CABI BIOSCIENCE is formed on 1 January, 1998 through the integration of CAB International's four scientific Institutes, IIBC, IIE, IIP and IMI.

Elizabeth Müller and Roger Price of PPRI inspect a "boma" during field trials in the Karoo

scan from slide

(Photograph by Roy Bateman)

## CABI BIOSCIENCE ESTABLISHED

January 1, 1998 marked the beginning of a new era for bioscience activities at CAB INTERNATIONAL. A new Division, CABI BIOSCIENCE, has been formed through the integration of CABI's four discipline-orientated scientific institutes, the International Institutes of Entomology (IIE), Parasitology (IIP) and Biological Control (IIBC) and the International Mycological Institute (IMI).

Activities will be focused under three sectors: Biological Pest Management; Environment; and Biodiversity & Biosystematics, through ten interrelated multidisciplinary Programmes. LUBILOSA will continue to be executed through CABI BIOSCIENCE by the Biopesticides Programme, led by David Dent, the LUBILOSA Programme Manager, in collaboration with IITA, CILSS and GTZ.

## LUBILOSA PROFILES



**Chris Lomer**, the LUBILOSA Programme Leader since taking over from Chris Prior in 1993, is taking a year's sabbatical / leave of absence from IITA, Benin in 1998 to live in Ankara, Turkey. Chris says he will focus on developing new ideas in insect pathology and getting married. Chris will continue to be involved in the programme's progress, participating in programme meetings, and will be writing up the

LUBILOSA Phase 3 Final Report as well as other research articles.



**Tina Scopa** graduated from Birmingham University with an MSc in Biochemical Engineering after obtaining a BSc Hons in Biotechnology from the University of Abertay, Dundee. Tina subsequently worked for a small pharmaceutical company in Edinburgh producing hyaluronic acid by microbial means before becoming involved in *Bacillus thuringiensis* and nematode production and

formulation in Umbria, Italy. Tina joins the LUBILOSA team at CABI BIOSCIENCE, Ascot and will be covering for Nina Jenkins who is on maternity leave.



**Hugo De Groote** joined the LUBILOSA team at IITA, Cotonou in 1997 as the socio-economist for the programme. He is responsible for the participatory trials which are important in raising awareness and strengthening interest of farmers in the *Metarhizium* mycoinsecticide and for the socio-economic analysis of the mycoinsecticide's market in Africa. Hugo studied tropical agriculture in Gent, Belgium and

obtained a PhD in agricultural economics while in the USA and has extensive experience of working on rural development projects and participatory research in Asia and Africa. He is married to Leslie who manages the US Embassy's self-help fund in Benin and they have three young children.



**Ine Stolz** studied Biogeography and Agricultural Sciences of the Tropics in Germany before working with the LOCUSTOX project in Senegal and with the GTZ project *Biological and Integrated Control of Locusts and Grasshoppers* in the south-west of Madagascar on locusts and ecotoxicology before arriving in Benin as an associate expert in LUBILOSA where she joined the ecotoxicology team led by Ralf Peveling to undertake a PhD.

## STORAGE OF MYCOINSECTICIDES

There is a basic requirement for an insecticidal product that it can be stored without losing its efficacy. This is as true for a mycoinsecticide as for a chemical and this has often been a major problem, especially when storage conditions are poor. A convention that has evolved over the last twenty years is that a product requires a minimum shelf life of at least 18 months (this would adequately cover two annual cropping seasons). With a predictable pest problem, a shelf life of 3-6 months may be acceptable but some of this may be under poor conditions such as high temperatures and humidity.

At the beginning of the LUBILOSA programme, the prospects for storing *Metarhizium flavoviride* conidia for 18 months at room temperature appeared slim. Even less likely were the chances of a fungal based product surviving the extremes to which a locust insecticide is often exposed; set by a desert airstrip, a barrel of mycoinsecticide may have to endure hours, if not days, at temperatures exceeding 50°C.

Initial results appeared to justify pessimism with formulations of conidia in various oils demonstrating loss of viability in weeks at 25°C. However, a programme of research and an excellent succession of sandwich course students (students having a work placement during their course) changed the mood. Tanya Stathers (University of Bath), Gary McClatchie, Jane Morley-Davies and Simon Hedgecock (all University of Brunel) carried out many experiments highlighting the critical importance of moisture content of the conidia as the major factor influencing storage characteristics.

The LUBILOSA programme is noted for openness with research data. By the time of the Society of Invertebrate Pathology meeting in North Carolina in 1993, we could demonstrate that, with a conidial moisture content of 4-5%, long term storage was achievable. Dry conidia, stored as powder, performed slightly better than those stored in oils.

Refinements have been made; the cyclone harvester at the production unit in Cotonou allows the collecting of very pure conidial powder. After drying, the powder is packaged in tri-laminate aluminium/plastic packets, preventing moisture uptake from the atmosphere by the very hygroscopic conidia. LUBILOSA research then demonstrated that dry conidia require careful rehydration, before exposing to free moisture, to prevent imbibition damage that can cause a great loss of viability. Current storage experiments on dry conidia in the laminated packets show that the product can be stored for over 3 years at cool temperatures (<10°C) and for over 12 months at 30°C and up to 6 weeks at 50°C without significant loss in viability.

Predictability of storage is also important and LUBILOSA has undertaken a fruitful collaboration with Dr Tran Hong and Professor Richard Ellis of the University of Reading. They are seed scientists who have worked on viability equations for seeds held at different moistures and temperatures. The work has shown many similarities between seeds and conidia and, when the collaboration is complete, it should be possible to predict for how long a particular batch of conidia will remain viable at uniform, or even fluctuating, temperatures. This will be a major advance in quality control. The collaboration has demonstrated another feature of LUBILOSA, combining academically rigid research with the very practical to achieve understanding of principles involved as well as an effective field product.

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