

FP7-project BIMOSYN – *The use of plant extracts as synergists to reduce the biocide content in insect sprays and wood protecting formulations*

Context and objectives

The Spanish Institute, Tecnalia, through its Construction Unit, has been participating in and coordinating a European FP7 research project for SMEs, called Bimosyn. The aim has been to develop pest control products and wood preservatives with lower concentrations of biocides and, thereby, be more environmentally friendly and less damaging for human health. The two year project has been carried out jointly by the Swedish University of Agricultural Sciences (SLU) and five European SME companies.

The scientific development of the project has involved research into the degree of synergy between plant antioxidant substances (natural extracts) and medicinal plant extracts with conventional insecticides and fungicides. The aim has been to use natural, vegetable-origin extracts with the potential for being employed as biocide adjuvants for the chemical sector. In this way, pest control products and wood preservatives which will have the same efficacy as conventional ones can be obtained and, at the same time, will be less prejudicial for the environment and to human health. The new formulations have the potential to combat plague of flies, cockroaches, termites and wood-rotting fungi.

Description of work and main results

In order to carry out this work, the project has been organized according to the following scheme of Work Packages: **WP1: Supply of raw material; WP2: Study of synergic effect; WP3: Formulation of pesticide products; WP4: Standardised biological and ecotoxicity laboratory tests; WP5: Industrial validation; WP6: Diffusion; WP7: Project Management**

After the first screening of synergic extracts, was found four positive candidates: two for wood protection and two for urban pesticide products, those were evaluated to confirm the synergic effects and to optimise the extract to biocide ratios. Work was also performed to identify possible active molecules in the extracts.

Two different types of synergic effect have been found:

A) Increased resistance of wood against fungal degradation after treatment with synergic extract from Berkem in combination with fungicide. To some extent, synergic effect was also found against xylophagous insects with insecticide.

B) Improved Knock-Down rate of house flies when combining synergic extract from Rutlandbio with several insecticides.

In the second part of the project, one extract for each of those two applications were selected for formulation of water based prototype products by the responsible SMEs. The commercial idea has been to intend to formulate similar products that the companies actually have on the market; that is concentrated micro-emulsion formulations to be diluted with water before application for professional users. With the formulated prototypes have been performed chemical stability tests and biological efficacy testing. To evaluate the wood protection prototypes European standard tests

was followed (basidiomycetic fungi: EN113; blue stain fungi: EN152; termites: EN117 and EN118; Hylotrupes larvae EN46) all after artificial ageing: leaching EN84 and evaporation EN73. The urban pesticide formulations were tested by a described method: Aerosol spray test against flying insects – Small chamber (Knockdown test) against *Musca domestica*. The final industrial evaluation included: larger sample treatment of wood and real case test with biocidal formulation, cost analysis and ecotoxicity evaluation of prototype formulations.

Main results with the prototype synergic wood protector:

- The effective concentration of fungicides in treated wood has been possible to lower from 150 g/m³ to 100 g/m³.
- Prototype against wood staining was effective with only 50 g/m³ fungicide.
- The insecticide prototype formulations still needs to be optimized, but in the screenings, without the ageing pre-treatments, was indicated a possible 50% reduction of insecticide.

Main results with the prototype pesticide formulation:

- One prototype found with improved knock-down on house flies, still needed optimization of formulation.
- Screening formulations have indicated potential to reduce the content of insecticide with up to 50%.

The SME companies are actually investigating the patentability of the discoveries and how to solve still present technical problems, before having functional products to exploit on the market.

Potential impact and use

The potential impact of the project results are derived from the possibility to reduce the content of actually used biocides in the investigated products: wood protector and sprayable insecticide. The following impacts can be foreseen:

Environmental impact

- Reduction of the use of conventional **toxic biocides**, which are harmful to the health and the environment.
- To promote the use of treated wood using more **environmentally-friendly products** in construction, civil works and infrastructure sectors and the agricultural sector, as opposed to materials treated with highly toxic products or products which are far more harmful to the environment such as steel and concrete.
- **To reduce** air, ground and underground water **pollution** caused by emissions being released into the atmosphere and the leaching of highly toxic biocide compounds.

Socio-economic and industrial impact

- To increase the **added value of food and agriculture residues** over other ones which are currently being used which are less profitable and interesting.

- To develop **more economical and environmentally-friendly** biocidal products than current biocides by substantially reducing the concentration of toxin and, therefore:
 - o To reduce the costs of treatment and offer more competitive biocidal products on the market.
 - o To reduce costs and legal and environmental requirements in treatment and in urban disinfection processes.
- To provide new substances, this may enable manufacturers of biocidal products to enter a new market for non-pollutant products that are guaranteed by standardized tests.
- To help to modernize and adapt the pest and wood industries to the coming changes.

The foreseen use of the results and possible interested partner depends on which extract and type of product to be produced, see below:

Patenting	-Interested SMEs
Further development and optimisation	-Interested SMEs and RTDs
BPD and Reach compliance	-Interested SMEs
Manufacturing of extract or extracts	-Rutlandbio and/or Berkem
Production of wood preservative and/or insect pesticide:	-DTS-Oabe and/or Berkem and/or Linotech
Use of final product(s)	-Quadrifolio in Portugal market

Project web-page

For further news of the synergic pesticide products, their development and introduction on the market, please visit the web-page: www.bimosyn.eu

List of Bimosyn project partners:

Partners	Partner Short name	Partner type	Country
FUNDACIÓN TECNALIA R&D	TECNALIA	RTD	Spain
DTS-OABE, S.L.	DTS-OABE	SME	Spain
RUTLAND BIODYNAMICS, Ltd.	RUTLANDBIO	SME	UK
SWEDISH UNIVERSITY OF AGRICULTURAL SCIENCES	SLU	RTD	Sweden
LINOTECH, AB.	LINOTECH	SME	Sweden
BERKEM DEVELOPPEMENT, SAS.	BERKEM	SME	France
QUADRIFOLIO, Lda.	QUADRIFOLIO	SME	Portugal



Photo: The Bimosyn partners at the Kick-off meeting at Tecnalia (then Cidemco) facilities in Azpeitia, Spain.

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