SfP – Bioproduction

SfP : 974453 'Bioproduction'

Title : ALTERNATIVE APPROACHES OF BIOPRODUCTION OF ALKALOIDS AND ACTIVE SUBSTANCES FROM BULGARIAN RARE AND THREATENED MEDICINAL PLANTS

Project Co-directors : Marina STANILOVA, Institute of Botany, BAS, Sofia (Bulgaria) (PPD);
Monique BURRUS, University Paul Sabatier, Toulouse (France) (NPD);
Mladenka ILIEVA- STOILOVA, Institute of Microbiology, BAS, Plovdiv (Bulgaria);
Christophe CLÉMENT, LBPV, Université de Reims Champagne Ardenne (France)

Approval Date: 01/12/00 Effective Starting Date : 15/02/01
Duration : 4 1/2 years; expected completion by mid June 2005

NATO Budget : 15, 000,000 BEF

Information about the SfP Project through Internet : not yet established

---

Major Objectives

To provide the pharmaceutical industry with alternative biomass sources of *Leucojum aestivum*, a rare and threatened plant species rich in alkaloids active against AD, and to propose new ways of producing them, while preserving the natural plant populations.

- ✓ To evaluate the current status of the Bulgarian populations of *L. aestivum*
- ✓ To constitute representative germplasm collection from wild populations
- ✓ To evaluate snowflake agronomic and biochemical performances of *L. aestivum* under field conditions
- ✓ To characterize soil composition of diverse natural *L. aestivum* populations
- ✓ To evaluate, select and multiply clones with high contents of biologically active substances
- ✓ To identify suitable biological material for *in vitro* experiments, to develop efficient *in vitro* cell cultures and micropropagation
- ✓ To characterize alkaloid production *in vitro* and *in vivo*
- ✓ To develop large scale *in vitro* cultures producing biologically active substances

Overview of Achievements since the Start of the Project until 31 October 2001

- ✓ A new Biotechnological Lab of Medicinal Plants, Institute of Botany, Sofia, with field facilities, has been installed, after major renovation funded by both BAS and the end-user ;
- ✓ Ecological assessment of 17 Bulgarian natural populations of *L. aestivum* has been performed, all information summarized and presented at the Optima meeting (Palermo, September '01) ; this operation will serve as the official annual assessment of the Bulgarian *L. aestivum* populations by the Ministry of Environment and Waters ;
- ✓ Eight *L. aestivum* populations were analyzed for their Gal content ; Bulbs (3, 055) and seeds (441 progenies) of the Gal-type populations were collected for the purpose of the Project, in agreement with local authorities in charge of natural population protection ;
- ✓ Germplasm nursery was constituted and clonal multiplication adapted to the plant species ;
- ✓ First callus formation was observed from bulbs or from ovaries, after an intensive study of culture conditions (growth regulators, environment, type of explants); conditions for desinfection and subcultures were also adjusted to the explants;
- ✓ Analytical determination of Gal and related alkaloids by TLC has been developed for fast screening purposes.

Payments through NATO Project Funds: 8, 368, 551 BEF

Milestones for the next six Months

- ✓ Germplasm analysis will continue with the Lycorenine-type populations of *L. aestivum*: characterization of the population status; elaboration of a general data basis summarizing all information collected on both the populations and the plants; collect of other plant material if needed for the other tasks;

- ✓ Characterization of the *L. aestivum* plants and populations will continue, at the karyological and the biochemical levels;
- ✓ Soil analysis will continue;
- ✓ Optimization of nutrient media for improved callogenesis will be done;
- ✓ Micropropagation will be initiated by analyzing the effects of sucrose and growth regulators on different explants;
- ✓ Accurate methods will be developed for Gal determination (extraction, purification, characterization);
- ✓ Training of young scientists will be held in Reims and Sofia.

NATO Consultant : Dr. G. Hahne, IBMP, Strasbourg, France (until dec. 2001)

Implementation of results

Not yet applicable at this stage

Collaborating institutions

None

Abbreviations : AD = Alzheimer disease ; Gal = Galanthamine