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Small molecules interfere with the tip-polarized growth of arabidopsis and tomato pollen tubes

Laggoun Ferdousse¹, Dardelle Flavien^{1,2}, Falconet Denis³, Lesnard Aurélien⁴, Rault Sylvain⁴, Driouich Azeddine^{1,5}, Lerouge Patrice¹, Lehner Arnaud¹ and Mollet Jean-Claude¹.

¹Laboratoire Glycobiologie et Matrice Extracellulaire Végétale, EA4358, IRIB, Normandy University, University of Rouen, 76821 Mont Saint-Aignan, France.

²Present address : Fitoplanton Marino, S.L. 11500 El Puerto de Santa María, Cádiz, Spain.

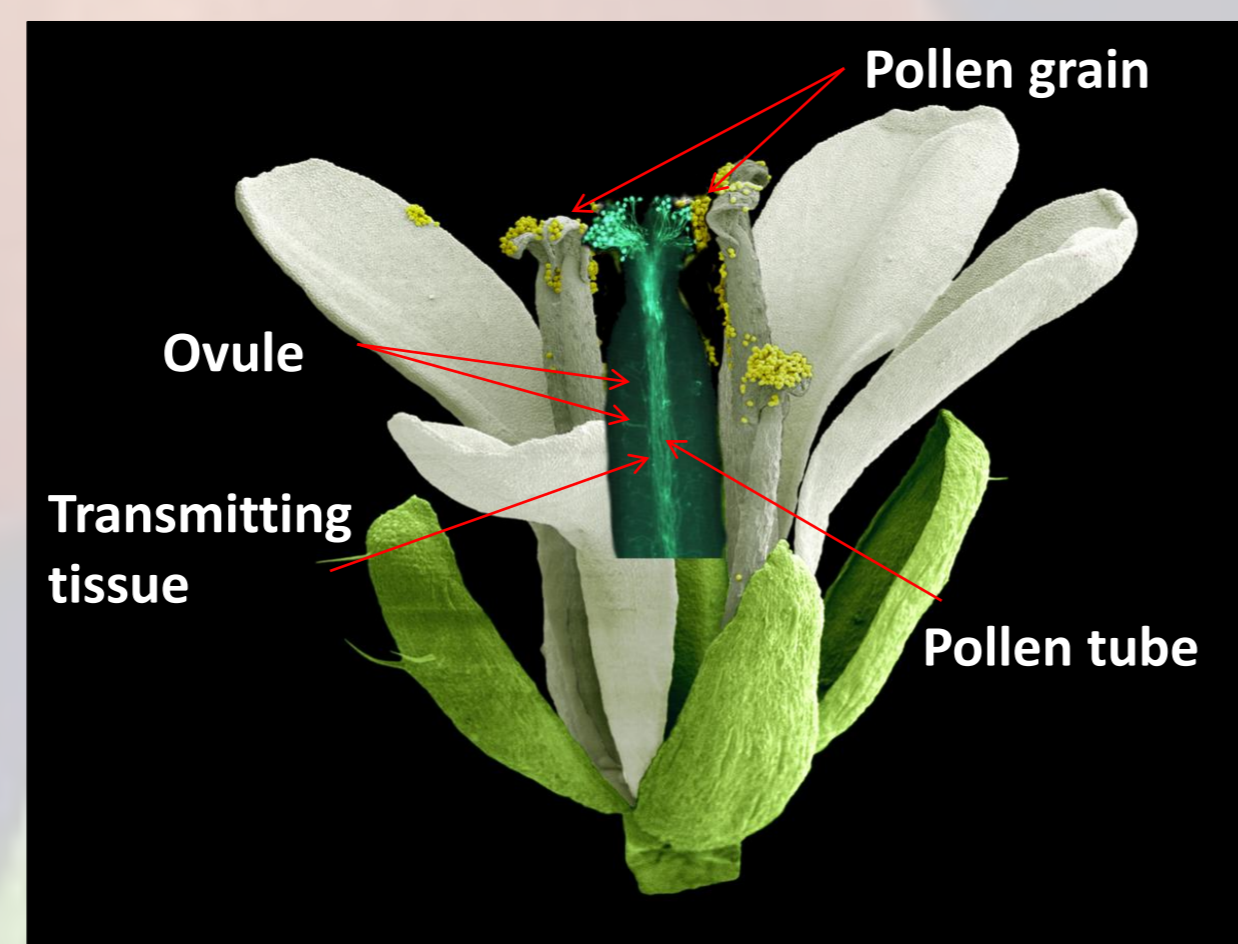
³Physiologie Cellulaire & Végétale (PCV), UMR 5168 - CEA - CNRS - INRA - Université Joseph Fourier, 38054 Grenoble, cedex 9, France.

⁴Centre d'Etudes et de Recherche sur le Médicament de Normandie UPRES EA 4258 - FR CNRS 3038 INC3M, Normandy University, University of Caen, 14032 Caen, France.

⁵Plate-forme de Recherche en imagerie de Haute Normandie (PRIMACEN), IRIB, Normandy University, University of Rouen, 76821 Mont Saint-Aignan, France.

I. Introduction

Sexual reproduction in land plants is of main economic importance because it allows the production of seeds. The process starts when the pollen grain lands on the stigma, rehydrates and produces a pollen tube, a tip-polarized cell that grows through the transmitting tract tissue and delivers the two sperm cells to the ovule.



II. Problematic

To date, the mechanisms that occur during the **tip-polarized growth, guidance and adhesion** of pollen tubes through the female transmitting tract tissue are not well known.

III. Aim of this work

To investigate these different mechanisms *in vitro*.

using a chemical screen approach

IV. Chemical Screen:



Using a chemical screen of 300 small bioactive compounds originating from the CERMN (Centre d'étude et de Recherche du Médicament de Normandie) in 96-well plates

8 compounds were selected

- ✓ 3 for their abilities to perturb *Arabidopsis thaliana* pollen tube growth and shape.
- ✓ 5 for their inhibiting effects on the adhesion of pollen tubes *in vitro* on a matrix composed of an enriched-pectin fraction isolated from *Arabidopsis thaliana* pistils.

V. Materials and Methods

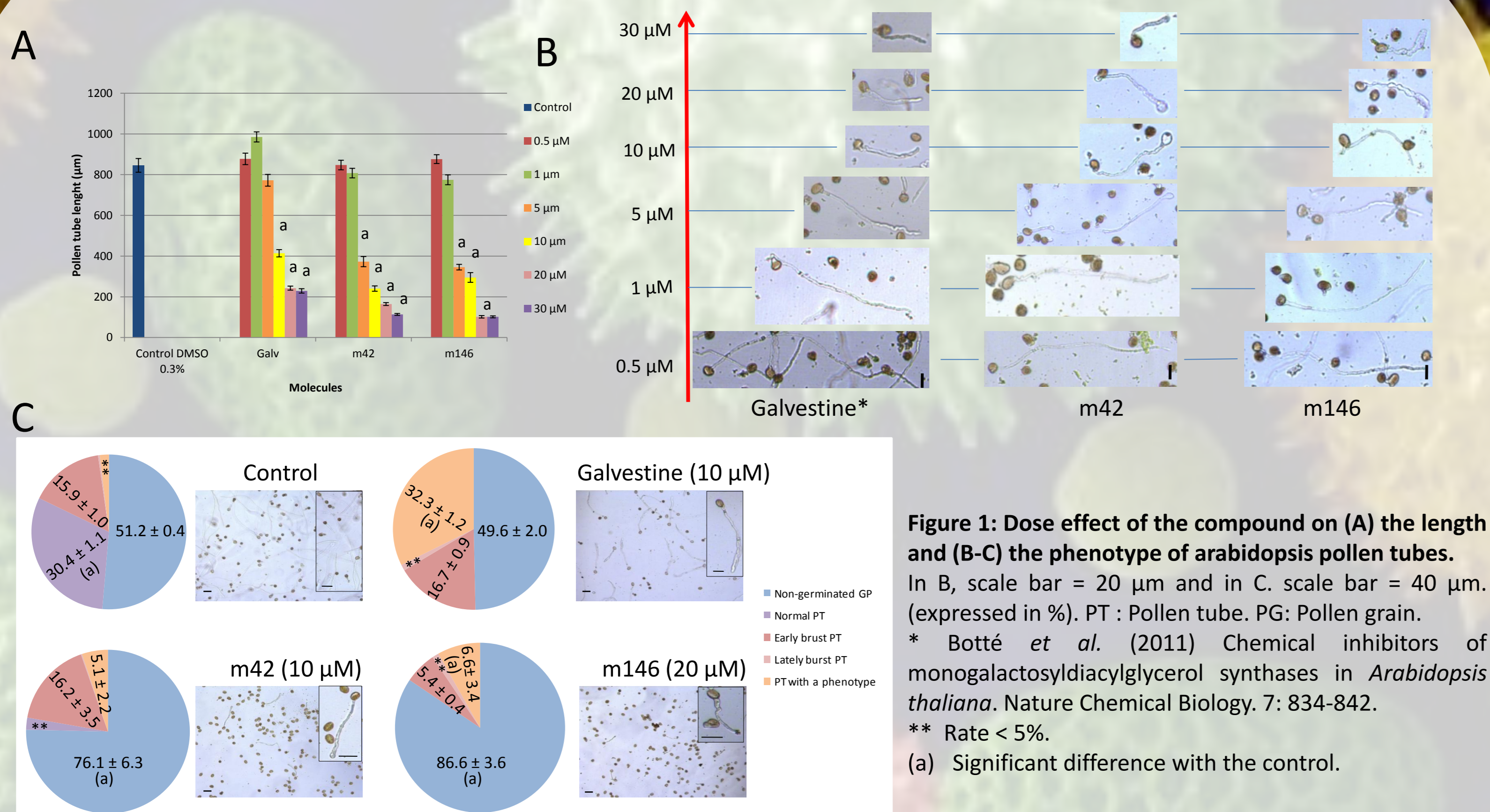
Flowers of *A. thaliana* and tomato (*Solanum lycopersicum*)

Extraction of pollen grains and culture for 6 h in a germination medium containing the selected compounds

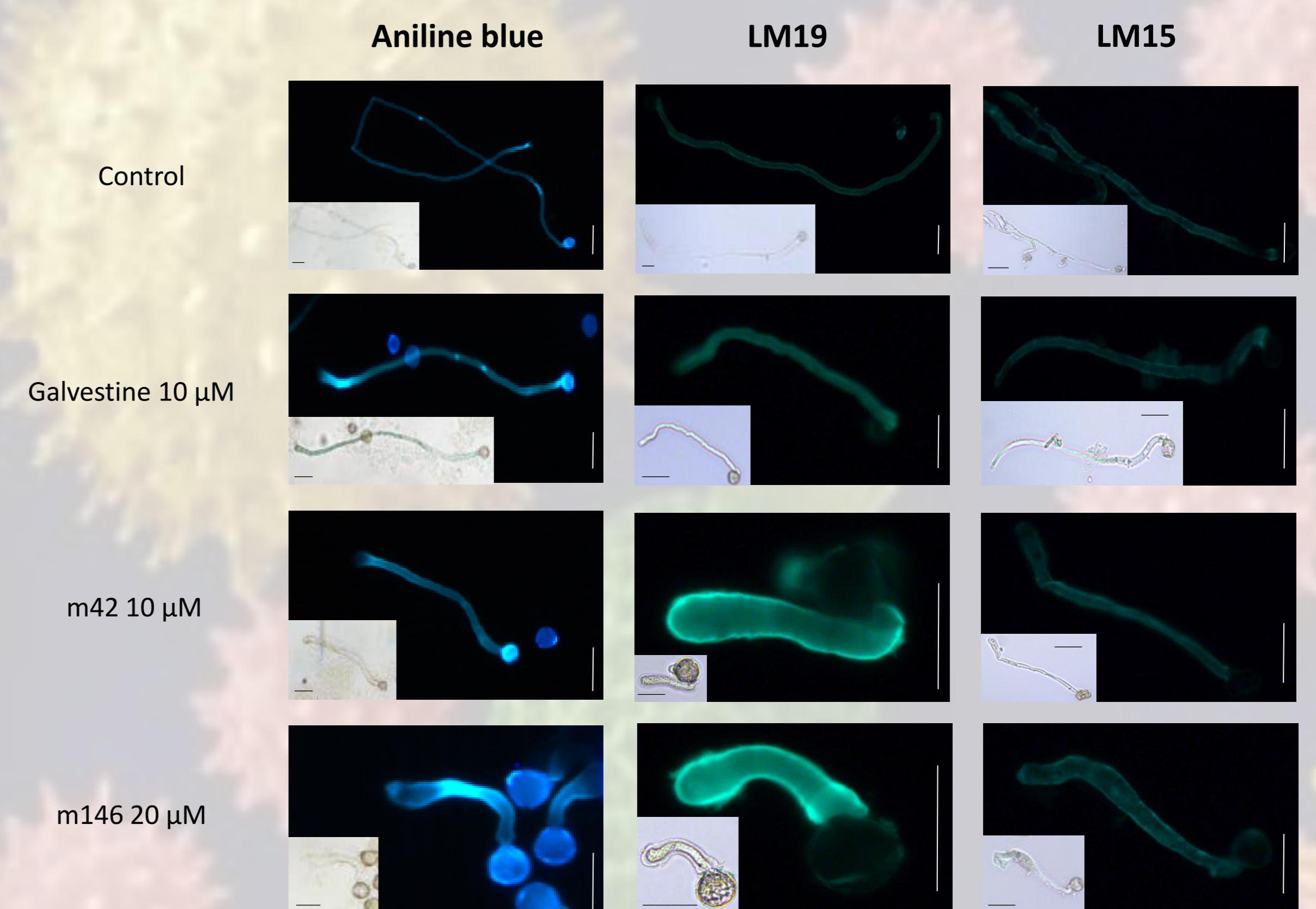
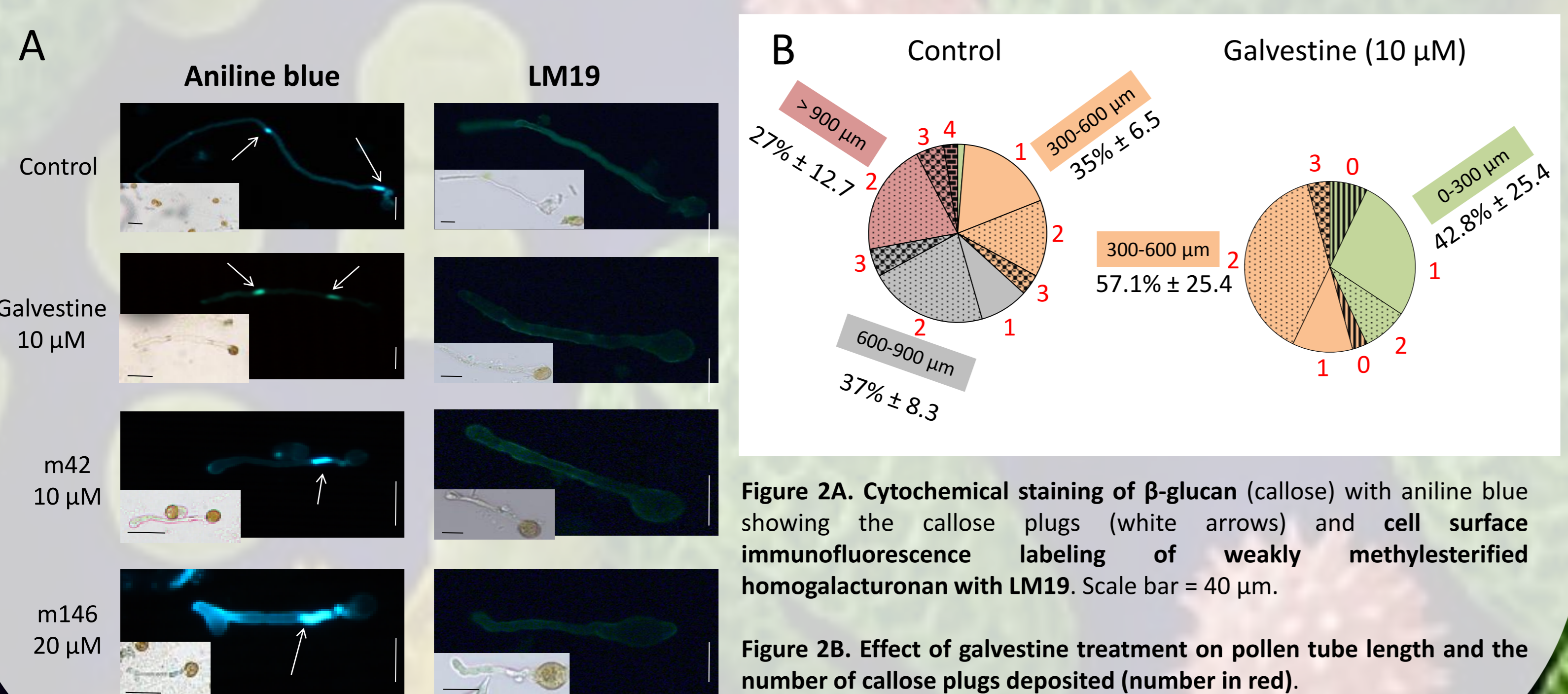
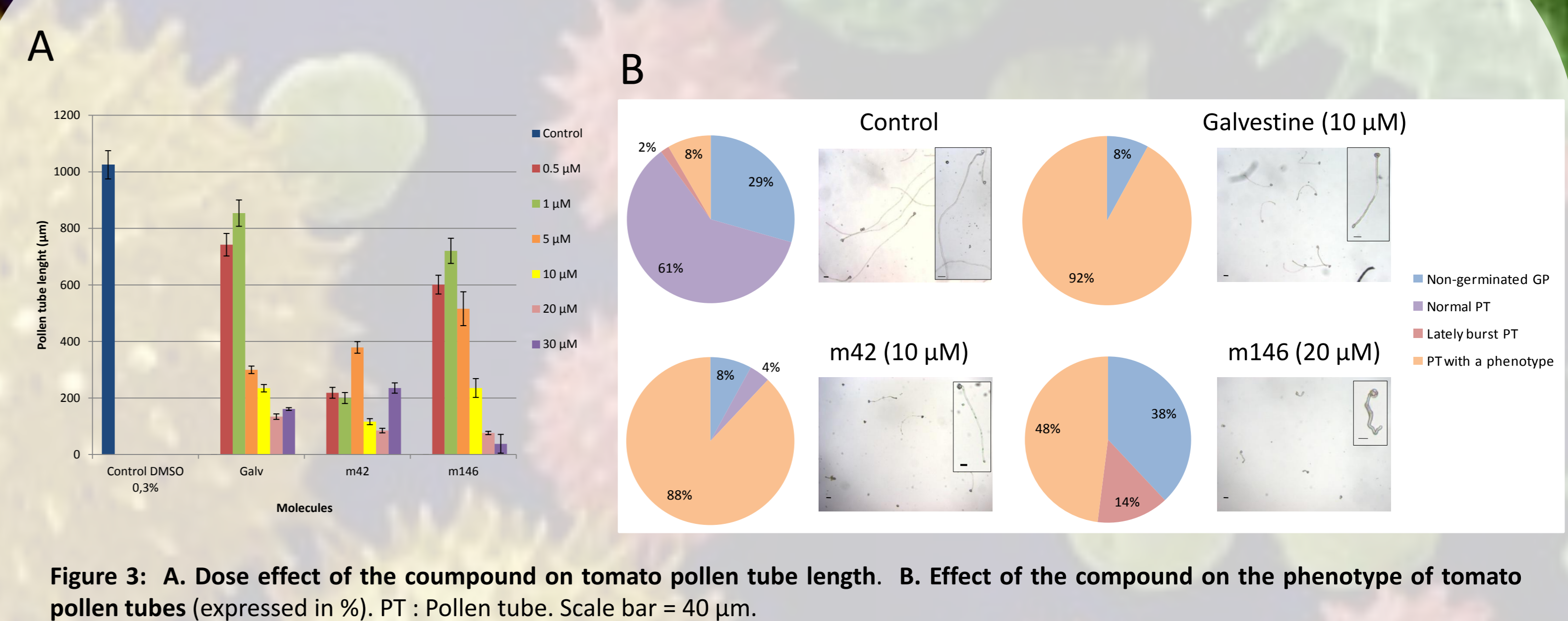
1/ Evaluation of the dose-dependent effect

2/ Select the concentration that induces a phenotype

VI. Effect on arabidopsis pollen tubes



VII. Effect on tomato pollen tubes



VII. Conclusions and perspectives :

- The selected compounds have a dose-dependent effect on arabidopsis and tomato pollen tube growth.
- In arabidopsis, the callose plug distribution is affected by galvestine treatment (a compound able to perturb galactolipid synthesis) and the pollen tube length is reduced. Similarly, the localisation of weakly methylesterified HG and xyloglucan was not affected in arabidopsis and tomato.
- In contrast, m42 and m146 have an effect on the tip-growth of arabidopsis and tomato pollen tubes with a noticeable accumulation of callose at the tip. M42 and m146 appeared to have an effect on the distribution of weakly methylesterified HG in tomato.

Effect of the compounds on the cytoskeleton organization of the pollen tube as well as the localization and characterization of the target of the compounds are in progress.