Developing a zebrafish-based pipeline to investigate the biological properties of medicinal plant extracts from Northern Vietnam

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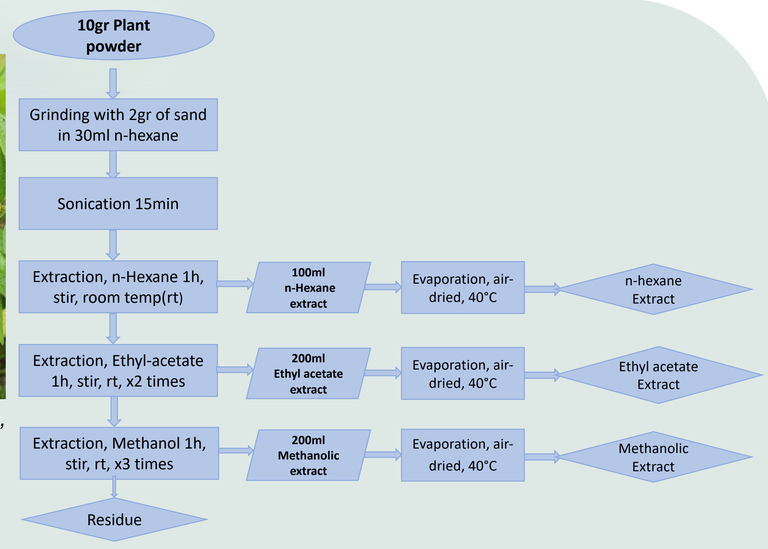
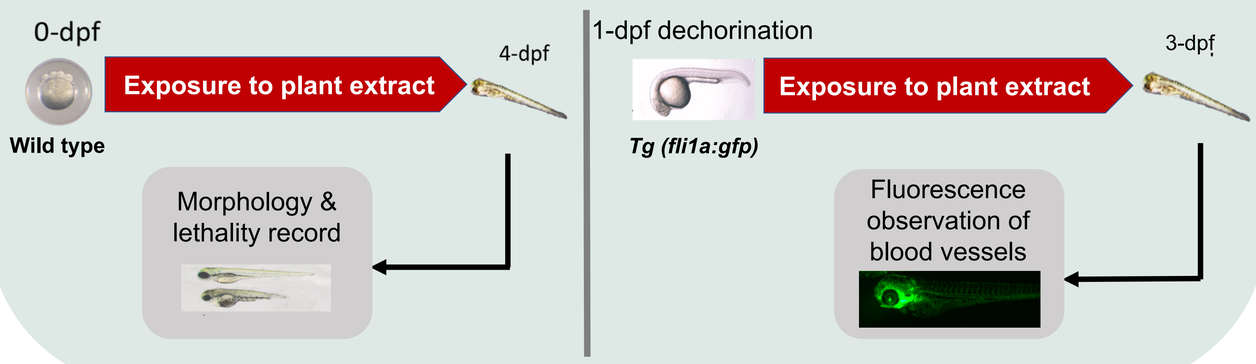
Introduction

Traditional medicines have been used in Vietnam for thousands of years, however, there is no clear definition of circumstances in which plants can be collected, conserved, and extracted; viable models for a productive and sustainable exploitation of natural extracts are missing, sometimes leading to severe and unfavorable consequences on health. In this study, we aim to develop a cost-effective pipeline to assess the pharmaco-/toxicological properties of these medicinal materials using the zebrafish embryo as an *in vivo* model. Proof-of-concept experiments were done by passing samples from two plants, *Caesalpinia sappan L.* and *Glochidion eriocarpum* which were collected from Northern Vietnam, to evaluate its efficiency.

Methods





Results

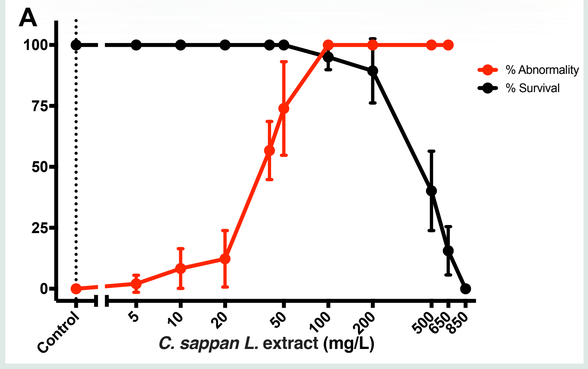


Figure 1. A. Effects of *C. sappan L.* extract on zebrafish embryonic morphology and lethality were determined in the corresponding concentration-response curves (LC_{50}=500 mg/L and EC_{50}=40 mg/L). B. *C. sappan L.* extract retards or inhibits zebrafish embryos dechorination by 2mg/ml pronase.

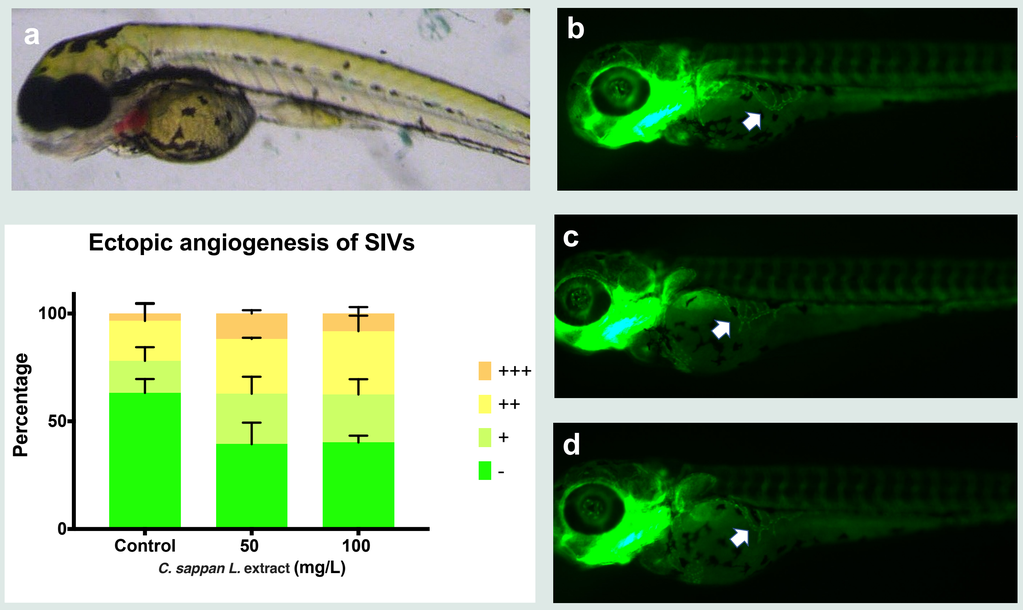


Figure 2. Anti-angiogenic properties in a dose dependent manner, (a) hemostasis phenotype under treatment, (b) control: blood vessels of transgenic *fli1a:gfp* zebrafish embryos can be easily observed; Sub intestinal vessels (SIVs) are marked by white arrows, (c,d) 50 mg/L and 100 mg/L *C.sappan L.* extract treatment triggers ectopic angiogenesis of SIVs.

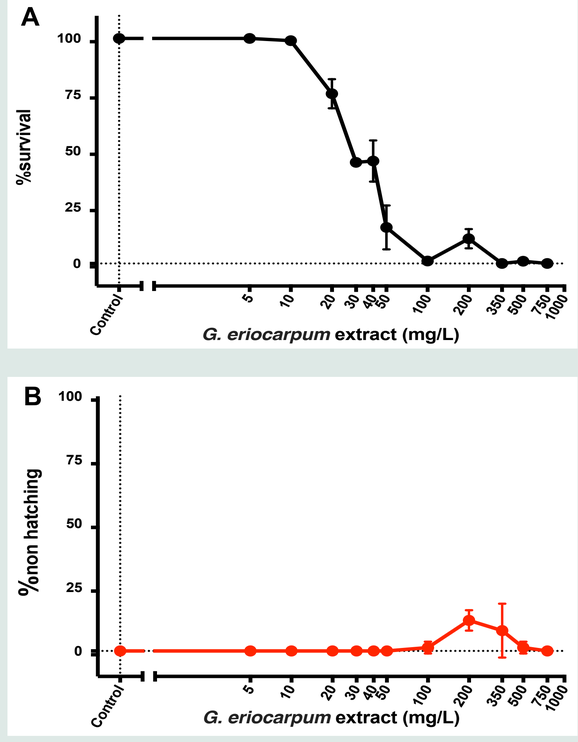


Figure 3. A. G. eriocarpum extract exposure led to a biphasic response from the zebrafish embryos, B. non-hatching rate was correlated with the second phase response in graph A, suggesting a protective role of the embryonic chorion

Conclusion

Our results may contribute to the design of a rational high throughput pharmacological screening approach using the zebrafish model

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