Research project of counterparts
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Name	Counterpart	Title
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Research summary

CVPD (*Citrus Vein Phloem Degeneration*) is a widespread disease in citrus plantations in Kintamani, Bangli, Bali, affecting the production and lowering the income of farmers. Socio-scientific teaching and learning (SSI-TL) has been suggested as an effective approach for supporting meaningful learning in school contexts (Sadler *et al.*, 2017).
The research aims to prepare a SSI module based on CVPD disease infecting citrus plantation in Kintamani Bangli-Bali. Information on CVPD disease infecting citrus plantations in Kintamani Bangli-Bali will be collected and used as material for the creation of SSI-based learning modules that can be used as student learning tools using Analysis, Design, Development, Implementation, and Evaluation (ADDIE) model (Fig. 1).

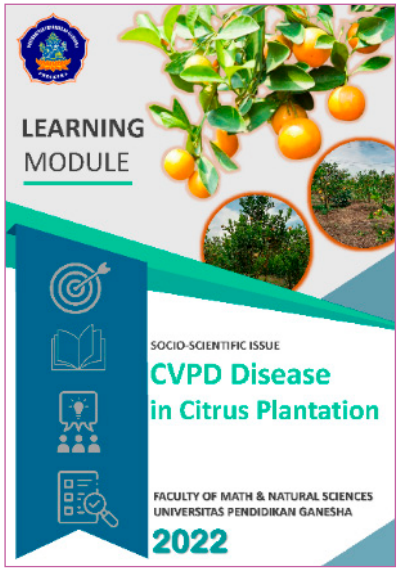

Figure 1. Cover design of this module using a citrus picture from the farm.

Design Stage

Here, students will learn about CVPD as a disease that attacks citrus plantations. They will analyze the symptoms of CVPD in citrus (Pic. 1, b). In the second section, this module will help students engage with three-dimensional learning related to CVPD disease, which attacks citrus plantations. They will discover disciplinary core ideas, crosscutting concepts, and scientific practice in these socio-scientific issues. After that, students will learn to find a possible way to prevent this disease in citrus plantations (including evaluation and reflection) through *Integrated Management of Healthy Citrus*. In the last section, the concept of sustainable development is introduced and it is discussed how far *Integrated Management of Healthy Citrus* relates to that. In every section, the module is completed with the learning objective, some information related to the issue, a summary, and an evaluation.

Apart from the information gotten from the interview with citrus farmers regarding the CVPD disease, the module will also cover some information related to the ways to preclude this CVPD disease by identifying the insect vector by analyzing DNA and citrus leaves. The identification started off by collecting samples from the leaves of citrus plants with symptoms of CVPD diseases. Observation of symptoms of CVPD (Citrus Vein Phloem Degeneratioan) disease is done visually. The results of visual observation of the typical symptoms of an attack on the leaves of citrus plants, in general, are indicated by chlorosis on the leaves, such as symptoms of deficiency of Zn and Mn elements. On the basis of visual observations, the signs of CVPD disease on Siamese citrus leaves in each location exhibited differing levels of chlorosis. When citrus plants are infected with CVPD, the leaves turn yellow or green, the leaf veins stay green, the size of the leaves shrinks, and the leaves become stiff.

Development Stage

Judges will review the module based on the design, content, and also language. This module (prototype 1) will be tested by two expert judges from the biology and chemistry education department. In the second evaluation, expert lecturers also give some feedback regarding the language and design of SSI module for better improvement. Finally, this module will be review by 15 selected students as they will use this module in next semester.

The results of prototype 2 evaluation by expert lecturers and selected students show that the SSI module developed is suitable for use and ready to implement next semester. By learning using contextual issues students will learn through experience instead of memorizing. Contextual learning can encourage students to have a more positive attitude toward learning science. When students can relate the concepts, they have learned to real-life situations, it means that they have inserted the context learned into the actual situation and transformed it into a life experience (Suryawati & Osman, 2017). The developed learning module will be based on contextual issues related to CVPD disease, which attacks several citrus plants and causes losses to local farmers. With the development of this learning module, students are expected to gain insight and understanding of CVPD issues, as well as raise awareness about some common issues in their surroundings and participate in environmental preservation.

Picture 1a+b. Here, students will learn about CVPD as a disease that attacks citrus plantations. They will analyze the symptoms of CVPD in citrus.

References

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