

Optimizing cacao pollination for higher yields

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A research team including Ingolf Steffan-Dewenter's Department of Animal Ecology and Tropical Biology has investigated how the cultivation of cacao can be improved by using the right pollination technique. The success of cacao cultivation depends to a large extent on functioning pollination. If there is a lack of pollinators, for example, this leads to lower yields—and thus to financial problems for farmers.

A study involving the University of Würzburg (JMU) has now investigated how the yield and quality of organic cacao can be increased—through a more efficient plantation design that's taking ecological aspects into account. During [field research](#) in Peru, the researchers identified pollination techniques that improved pollination success and produced higher quality fruit.

To do this, the team first compared self-pollination of the flower with cross-pollination. In self-pollination, the stigma is pollinated by [pollen](#) from one's own flower (which are genetically identical), whereas in cross-pollination the pollen comes from a flower of another cacao tree. The result: While self-pollination led to only limited success, this value improved three to eight times with cross-pollinated plants. The findings are published in the journal *Agriculture, Ecosystems & Environment*.

Study provides basis for improved plantation design

"Cacao has a mechanism that seems to prevent self-pollination," explains

Dr. Justine Vansynghel, researcher at the Department of Animal Ecology and Tropical Biology (Zoology III). A high genetic difference, that is the lowest possible degree of relationship between pollen donor and pollen recipient, is crucial for pollination success.

"Our research helps farmers in a very concrete way to optimize their plantations for natural cross-pollination in the future," she continues. "We can identify pollinator-recipient combinations that produce high-quality fruit and should therefore be planted spatially close together. This goes hand in hand with better land use, higher yields and thereby a higher income for farmers."

In addition to genetic make-up, the scientists were even able to identify other [environmental factors](#) that affect [pollination](#) success, such as temperature and [relative humidity](#).

More information: Justine Vansynghel et al, Cross-pollination with native genotypes improves fruit set and yield quality of Peruvian cacao, *Agriculture, Ecosystems & Environment* (2023). [DOI: 10.1016/j.agee.2023.108671](#)

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