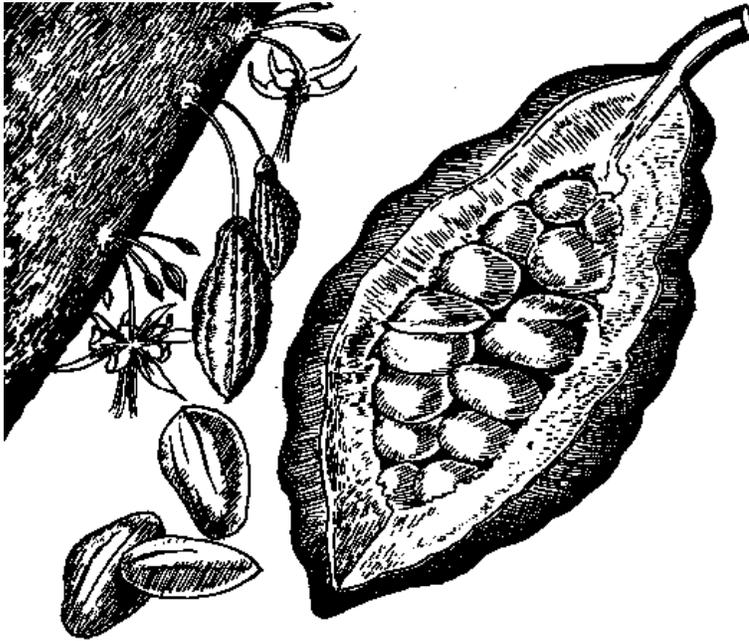


Cocoa Pod Prophylactics: Life and Death in Sulawesi



For many of us, chocolate isn't just a once-in-a-while sweet treat. It is the sixth food group—a daily staple in our diet.

Cacao has been grown in Indonesia since as early as 1560. In present-day Sulawesi, its cultivation is a major source of income. (Illustration by J.A. Sutherland, University of New England, Australia.)

So we might do well to pay attention when an insect half a world away threatens cacao trees in Indonesia. Cacao trees produce cocoa pods, and cocoa—the source of chocolate—is no small thing in Indonesia. The archipelagic nation is the world's third largest producer of this commodity after the Ivory Coast and Ghana. In the central island of Sulawesi alone, more than 100,000 small-scale farmers cultivate the crop on 1.2 million acres.

It is here that a tiny villain has undone much of the cocoa trade and turned many a cacao plantation into a costly, abandoned relic. The USAID-funded Integrated Pest Management Feed the Future Food Security Innovation Lab (IPM IL) managed by Virginia Tech's Center for International Research, Education, and Development is seeking to bring the industry back, and to do so in an environmentally friendly way.

Enemies of the cocoa pod are legion and sound like creatures from a Harry Potter novel: mirids and capsids (insects), witches' broom, monilia pod rot, vascular streak dieback, frosty pod rot, and Cocoa swollen shoot virus. But it is the *Conopomorpha cramerella* Snellen, or cocoa pod borer moth, that is the plant's major nemesis in Indonesia.

Throughout the country's many islands, this tiny moth has taken up residence with devastating effects. The pod borer, one centimeter in length, smaller than the fingernail on your pinky, wreaks its havoc by laying eggs into the furrows of the cocoa pod by night. Once they hatch, tiny caterpillars then bore into the pod, feed on the connective tissue inside, and re-emerge to pupate and continue the cycle.

While the borers seldom eat the actual cocoa beans, they cause the beans to stick together, be undersized, and be of poor quality. Production losses in infested areas can be





huge, up to half the crop for many small-scale farmers.

The customary way to battle this insect has been to use pesticides. But besides being highly toxic, pesticides are ineffective against the pod borer. The cocoa moth lays its eggs at night, and, upon hatching, the young larvae quickly bore into the fruit where pesticides cannot reach them.

By using degradable sleeves like this one, farmers are able to kill two birds with one stone: protect the cocoa pod from pests and not harm the environment. Photo credit: Merle Shepard, Clemson University.

Over the past 10 years, another method has been tried—sleeving. With this technique, a worker ties a plastic bag around the cocoa pod as a sort of plant prophylactic. Indeed, the Indonesians call it “kondomisasi,” or “condomization.” While this is effective in keeping the cocoa moth off the pod, after the bags have served their usefulness, they often wind up as refuse in fields and streams.

Now, with the intervention of the Virginia Tech-led IPM IL, farmers are finding a way to be more environmentally friendly. They are using degradable plastic bags provided by Oxobioplast, Inc., a Canadian company, as the sleeving device. With this method, the same technique is used. The bags are tied around the cocoa pods once they have reached about 10 centimeters. Then, when the bag has served its purpose, it can simply be torn off and left in the field. Once the bag touches dirt, it starts to disintegrate. Within four months, the sleeves degrade to carbon dioxide and water, leaving no residue. To date, the method has been used experimentally at several sites, including an abandoned plantation.

Merle Shepard, a Clemson University entomologist and collaborating researcher on the project, is optimistic that the degradable sleeving technique will bring the cacao industry back to Sulawesi. “The experiments so far have been very encouraging,” he says.

Shepard has worked with Virginia Tech researchers on agricultural techniques since the early 1990s. “It’s so rewarding to see the IPM techniques being used and, especially in this case, to see the potential for a whole industry to be revived,” he says.

Muni Muniappan, director of the IPM IL, concurs. “This is a great example of how the IPM IL benefits multiple stakeholders: small-scale farmers in Indonesia, as well as consumers in the United States and around the world. It shows how IPM incorporates safe methods of tackling pests,” he says. With the European Union tightening its regulations on the maximum residue levels of pesticides permitted on imported cocoa, any practice that reduces the use of pesticides is a good thing.

The next step will be more trials to make sure that ants and crickets do not destroy the sleeves before they have served their purpose. “So far, results look very good,” Shepard says. Researchers plan to get the word out about the practice by holding farmer field schools and working through government agencies and non-governmental organizations.

Finally, farmers in Sulawesi, one of the cocoa baskets of the world, have some hope that they can reclaim their livelihood. And you and I can relax when we bite into that sweet, after-dinner confection.