

ECOTIPPINGPOINTS VIDEO SCRIPT

ESCAPING THE PESTICIDE TRAP: NON-PESTICIDE MANAGEMENT IN ANDHRA PRADESH, INDIA

Gerald Marten

Farmers worldwide use more than two million tons of chemical pesticides each year. Many of the pesticides, which are manufactured from petroleum, kill insects that eat the crops. Those pesticides seem essential for preventing serious crop losses, but there are equally serious questions about how much we really benefit from their use. After all, pesticides are poisons. They can contaminate our food, endangering our health in ways that we are not even aware of. And the same poisons also spread through the environment, seriously damaging other living things with which we share this Planet. Our massive use of pesticides seems to be addictive. The more we use the pesticides, the more we seem to need them.

A dramatic story about cotton farmers in India shows how destructive pesticides can be for people and the environment; and why today's agriculture is so dependent on pesticides. This story also shows that it's possible to stop using chemical pesticides without losing a crop to ravaging insects, and it explains how to do it.

The story began about 30 years ago, when cotton production started spreading through Andhra Pradesh state. The high value of cotton made it an exceptionally attractive crop, but growing cotton required chemical fertilizers and pesticides. As most of the farmers were poor, illiterate, and without previous experience using agricultural chemicals, they were forced to rely on local, small-scale agricultural dealers for advice. The dealers sold them seeds, fertilizers, and pesticides on credit and also guaranteed purchase of their crop. The dealers themselves had little technical knowledge about pesticides. They merely passed on promotional information from multinational chemical companies that supplied their products.

At first, cotton yields were high, and expenses for pesticides were low because cotton pests had not yet moved in. The farmers had never earned so much! But within a few years, cotton pests like bollworms and aphids plagued the fields, and the farmers saw how rapid insect evolution can be. Repeated spraying killed off the weaker pests, but left the ones most resistant to pesticides to multiply. As pesticide resistance mounted, the farmers had to apply more and more of the pesticides to get the same results. At the same time, the pesticides killed off birds, wasps, beetles, spiders, and other predators that had once provided natural control of pest insects. Without these predators, the pests could destroy the entire crop if pesticides were not used. Eventually, farmers were mixing pesticide "cocktails" containing as many as ten different brands and sometimes having to spray their cotton as frequently as two times a week. They were really hooked!

The cotton was also gobbling up essential nutrients in the soil, leaving the farmers no choice but to use even larger quantities of costly chemical fertilizers. Soon the cost to produce cotton was more than they could earn from selling it. Since they bought their fertilizers and pesticides on credit, the farmers fell further and further into debt. To feed their children, some families were forced to hand over their children to other farmers as indentured laborers.

Even worse, the addiction to pesticides had catastrophic effects on their health. Exposure to the toxic chemicals was intense because these small-scale farmers had to spray by hand. Even children sometimes helped, and most people had no training on how to use, store, or dispose of the pesticides. Chronic health problems such as headaches, nausea, skin rashes, fatigue, depression, and visual complaints became common, and sometimes there was permanent nerve damage or death. Enormous medical bills drove families further into debt. For some, it seemed they would never get out.

If someone tried to quit growing cotton, the agricultural chemical dealer would say “You can stop, but of course if you are no longer my customer, I expect you to repay your entire debt right away.” The farmers were really trapped! Despair over debt and health problems was so severe that the suicide rate in Andhra Pradesh became the highest in India. The favored method was to drink a pesticide cocktail.

Then, around 1998, a non-profit organization called SECURE started talking to the farmers in Punukula, a small village of approximately 900 people, about changing the way they raised cotton. SECURE arranged for some of the villagers to travel 400 km to visit a small farm that was successfully using natural methods to control agricultural pests.

The villagers were hesitant, but one of Punukula’s village elders decided to risk trying the natural methods instead of pesticides. His son had collapsed with acute pesticide poisoning and survived, but the hospital bill was staggering. SECURE’s staff coached this villager on how to protect his cotton crop by using a toolkit of natural methods that India’s Center for Sustainable Agriculture put together in collaboration with scientists at Andhra Pradesh’s state university. They called the toolkit “Non-Pesticide Management” – or “NPM.”

The most important resource in the NPM toolkit was the neem tree, which is common throughout much of India. Neem trees protect themselves against insects with an arsenal of chemical defenses that repel egg-laying, interfere with insect growth, and most important, disrupt the ability of crop-eating insects to sense their food. Pest insects starve. Unlike commercial pesticides, which usually employ a single toxic chemical, neem has a wide array of chemical defenses, so its insect enemies cannot develop resistance. And because neem’s toxins evolved specifically to defeat plant-eating insects, the toxins are harmless to humans and other animals, including the birds and insects that eat pest insects.

In fact, neem has been used traditionally in India to protect stored grains from insects and to produce soaps, skin lotions, and other health products. To protect crops from insects, neem leaves and seeds are simply ground into a powder that is soaked overnight in water. The solution is then sprayed onto the crop. Another preparation, neem cake, can be mixed into the soil to kill pests and diseases in the soil, and it doubles as an organic fertilizer high in nitrogen. Neem trees grow locally, so the only “cost” is the labor to prepare neem for application to fields.

In addition to neem, the Non-Pesticide Management toolkit included:

- Spraying chili-garlic solution onto the cotton, particularly when an infestation is severe. Chili-garlic causes the pest insects to fall off the crop, but does not harm insects that prey on the pests.

- Applying a mixture of cow dung and cow urine onto the cotton plants. This mixture provides natural fertilizer, as well as a rough coating on the surface of the plants, which discourages aphids and other sucking insects from laying their eggs and obstructs their feeding.
- Applying a naturally occurring virus that infects cotton bollworms. The virus is fatal to bollworms, but harmless to other creatures. Farmers can manage this “biological warfare” themselves by gathering infected bollworms from their cotton plants and grinding them into a solution which is sprayed on the crop with lethal results for the bollworms.
- Planting “trap crops” such as sorghum, marigold, castor, and maize in and around the fields to attract pest insects away from the cotton.
- Removing and burning cotton and trap-crop branches that are heavily infested.
- Putting out small boards painted white or yellow and covered with sticky grease to trap pest insects.
- Lighting small bonfires on moonless nights to attract and kill bollworm moths.
- Enlisting insect-eating birds as allies by planting bird perches in the fields.
- Deep summer plowing to disrupt the life cycle of bollworms and other pests whose pupae are in the soil.
- Trapping bollworm moths in plastic bags by attracting them into the bags with the scent from inexpensive pheromone tablets. The purpose is to assess the abundance of the bollworms. With careful insect monitoring, farmers can save time and effort by spraying their fields with neem or other natural pesticides only when pest insects are abundant enough to damage the crop.

The first farmer’s trial with NPM was a complete success! His harvest was as good as the harvests of farmers that were using pesticides, and he earned much more because he did not spend a single rupee on pesticides. Inspired by this success, 20 farmers tried NPM the next year. SECURE posted two well-trained staff in Pudukula to teach and help everyone in the village, and the village women put pressure on their husbands to stop using toxic chemicals. Families that were no longer exposing themselves to pesticides began to feel much better, and the rapid improvements in income, health, and general wellbeing quickly sold everyone on the value of NPM. By 2000, all the farmers in Pudukula were using NPM, not only for cotton, but for their other crops as well. In 2004 the village council declared Pudukula a pesticide-free village, and the villagers began earthworm composting so they no longer needed chemical fertilizers. The villagers were once again organic farmers, but with a much more up-to-date and effective toolkit than they had used in their traditional past.

Within a few years, the populations of insect-eating birds and other insect predators bounced back, providing natural pest control, so less neem was needed. As pesticide and fertilizer costs and medical bills went down, farmers were able to start paying off their debts. By presenting a united

front, the villagers were able to resist the dealers' attempts to bully them into immediate repayment of their entire debts, and within a few years the debts were paid off.

The suicide epidemic came to an end. And with the cash, health, and energy that returned when they stopped poisoning themselves with pesticides, the villagers were inspired to start more community and business projects. The women of Pudukula created a new source of income by collecting, grinding, and selling neem for NPM in other villages. The villagers rescued their indentured children and gave them special six-month "catch-up" courses to return to school.

Fighting against pesticides, and winning, increased village solidarity, self-confidence, and optimism about the future. When dealers tried to punish NPM users by paying less for NPM cotton, the farmers united to form a marketing cooperative that found fairer prices elsewhere. The leadership and collaboration skills that the citizens of Pudukula developed in the NPM struggle have helped them to take on other challenges, like purifying their drinking water, building a cotton gin to add value to the cotton before they sell it, and convincing the state government to support NPM over the objection of multi-national pesticide corporations.

Devising the NPM toolkit and putting it into use was an EcoTipping Point – a lever that turned the farmers and their environmental support system from decline to a path of restoration and sustainability. NPM is now taught in local schools, and the state government's Society for Elimination of Rural Poverty has provided NPM training to thousands of women in self-help groups throughout the state. By 2008, 340,000 farmers in more than 3,000 villages were using NPM on nearly one million acres of cropland, not only for cotton but also for grain and vegetable crops. The escape from pesticide addiction continues to spread across the region, showing that it really can be done, and it can be done with readily available and inexpensive natural materials. The achievements of these farmers offer lessons for us all about enlisting nature to do the work of restoring and sustaining a healthy environment.

Details of the Non-Pesticide Management story and dozens of other environmental success stories can be seen at the EcoTipping Points website: www.ecotippingpoints.org.