Community-based armyworm forecasting **saves crops**

Research Into Use

Self-contained village forecasting helps communities defend against crop loss from outbreaks of African armyworm. On-the-spot early warnings give them time to act to save their crops.

Above: Small pests: large losses. Farmers often lose all their crops during a plague of armyworms. Photo: D. Grzywacz

The African armyworm devastates crops and grasslands in eastern and southern Africa. Severe outbreaks catch farmers unprepared. Forecasts from national forecasting services often do not reach them in time, if at all. Now, villages can forecast armyworm outbreaks using just a moth trap and rain gauge. Early warning means farmers can act quickly to spray their crops and prevent losses.

National forecasts fail to warn farmers of armyworm outbreaks in time for them to act

When plagues of African armyworm attack they destroy smallholder crops and large commercial production alike. But, for millions of small-scale farmers and their families, losing part or all of their crop often means hunger or starvation.

In Ethiopia between 1985 and 2005, the African armyworm attacked from 10,000 to over 350,000 hectares each year. And, in Tanzania in 1999, a severe outbreak devastated 311,000 hectares of cereals and grassland. Farmers who could not spray, or who delayed spraying, lost their entire crop. Plus, many cattle died from eating infested grass.

Central government forecasts do not reach farmers—particularly small farmers—in time for them to act to protect their crops against armyworm. Another problem is that central offices usually issue forecasts for districts, not for each village. Often, only some villages in a district will be affected, not all. Plus, many farmers do not get the forecasts at all.

Routine forecasting in villages gives farmers longer to prepare

Community-based armyworm forecasting is most useful in areas where the risks of outbreaks are high. It needs little technical know-how. Based on forecasting 'rules' and low-cost equipment, communities can predict outbreaks of armyworm fairly accurately.

Scientists found that outbreaks happen when storms carry in moths to areas where there is plenty of food—fields of maize, sorghum, millet, wheat, rice, sugarcane, wheat, barley or grass. They lay their eggs on the leaves and, a few days later, the armyworms hatch out. They grow quickly and rapidly destroy the crops. Then they burrow into the soil, turn into pupae, and later turn into moths and fly away at night.

Scientists worked out a simple rule:

> Crops in the village that the armyworms can feed on + 30 moths in the past week + more than 5 mm rain in the past week = likely outbreak of armyworm.

And, to be on the safe side, if the forecast in the previous week indicated an outbreak, then an armyworm warning should still be given in the current week (even if the current week's forecast does not show that an outbreak is likely).

Using this simple rule and simple equipment, villagers can do their own forecasting. The equipment is put together in village forecasting packs. Each pack has an armyworm moth trap, two rubber baits in an airtight bottle, dawa (pesticide—to kill the moths in the trap), an instruction sheet for the moth trap, a rain gauge, a rain collection cup and measuring cylinder, an instruction sheet for the rain gauge, an instruction sheet for forecasting, data sheets, pens and pencils, outbreak record cards, and armyworm posters and leaflets.

The community chooses who will learn to use the equipment and make forecasts. The group also decides the best way to spread the warning rapidly through the village if an armyworm outbreak is likely, for example, by alerting the school, mosque, church, farmers and others who need to know.

Above: A simple moth trap helps villagers forecast devastating outbreaks of armyworm.
Photo: D. Grzywacz

Once trained, the village forecasters set up the moth trap and rain gauge. Then, at the same time every day, they record the number of moths in the moth trap, the rainfall and the amount of crops in the village.

Once a week they complete a summary sheet and, using the simple rule, work out a forecast. If the result is an armyworm warning, the forecasters spread the word to those who need to know according to the plan agreed by the village leaders.

Forecasting stops at the end of the rainy season and the village leaders store the traps and equipment until the following year.

Once set up, communities need little help with the forecasting system—just new lures for the moth trap each year and replacements for any broken equipment.

Photo: D. Grzywacz

For millions of small-scale farmers and their families, losing part or all of their crop often means **hunger or starvation**

Building defences against armyworm attacks

There are four steps to building village defences against armyworm attacks:

1. Help villagers learn about armyworms, what they look like, where they come from and what damage they can do. Posters and leaflets showing the armyworm moths, the armyworms when they are small and green, and full-grown large black armyworms are useful.

Above: Posters and leaflets show farmers how to defend against armyworm.

2. Help villagers predict when outbreaks of armyworm are likely. Forecasting for the whole village can be done by one person. To do this though, the person the village chooses to be a forecaster needs training and equipment. When forecasters have been trained, they keep daily records of the amount of rainfall, the number of moths and the village crops, and make weekly forecasts. If an armyworm outbreak is likely, then they send out a warning.

3. Help villagers learn how to check their fields for armyworms when there is an armyworm warning. The small worms are difficult to see. Some hang from the leaves on threads like spiders. Farmers can look for small scrapes on the leaves where armyworms have started feeding too. The small worms also stick to shoes and clothes.

4. Tell villagers how to kill armyworms. It's best to kill armyworms before they grow large and destroy crops. Kill them any way that works. If there is a traditional way of controlling armyworm, use that. Dawa spray is expensive but successful.

Public meetings start the ball rolling

The best place to get started with community-based forecasting is in the villages.

Communities need to feel that armyworms are a big problem and want to do something about it. In the first place, they need to believe that a village forecasting system will help solve their problem.

So, holding a couple of public meetings to get their views is very worthwhile. It's useful to find out how much farmers have lost because of armyworms over the years. Also, it's useful to know whether they find the national forecasts helpful and if not, why not. The meetings

introduce the forecasting system and give the community ownership of both the problem and the solution from the beginning.

Villages make their own decisions

If villagers decide that forecasting will help them, they need to elect a person to become their forecaster. They also need to decide who will make sure warnings reach farmers quickly and what farmers will do when they hear that armyworms are likely to attack.

Training village forecasters takes two days

The training workshops are very practical. As well as learning about armyworm biology, the forecasters learn how to set up a rain gauge and moth trap, how to collect and record daily data about moths, rainfall, and vegetation, and how to calculate a weekly forecast.

Forecasters can set up the rain gauge and moth traps straight after the training course. This means they can begin to record data and make weekly forecasts immediately.

Above: Army worm moths. Photo: D. Grzywacz

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Photo: D. Grzywacz

Local forecasts strengthen the national system

National forecasting services take advantage of satellite data and they coordinate data from around the country. But, though national forecasts give a good general idea of armyworm outbreaks in a particular season, they don't predict when and where outbreaks will occur very accurately. Local forecasts based on local data are more accurate. Local data, when fed into a central database, also strengthens national forecasting.

The right technology in the right place

Farmers appreciate the importance of community forecasting and see that it works. They understand better what armyworms are and why outbreaks happen. This is particularly important for the poorest farmers who are likely to be most affected by outbreaks of armyworm.

Plus, farmers are more likely to act on warnings when they come from a reliable local source. Village forecasts are both generated and used on the spot. Communication problems between national forecasting offices and rural communities disappear. Instead of waiting for forecasts from central offices to be passed on by district offices, farmers often get warnings instantly from the forecasters themselves.

Farmers visit their fields to check for armyworm more often when there is a village forecasting system. When farmers check their fields more often, they detect any armyworms earlier. This improves control and reduces losses. They spray earlier and replant less often. Fewer crop losses means higher yields, more produce to sell, more food and better livelihoods.

Village forecasting is also cost effective. Moth traps cost about US$10 and last about five years. Traps need two baits (lures) each season, costing US$5 each. Rainfall gauges last about 10 years. Villages can choose whether or not to pay their forecasters for the hour or so each day that it takes to check the moth traps, rain gauge and record data. But, taking into account the setup cost and the annual running costs—around US$35 a year—costs are quickly recovered even if yields improve only moderately. When outbreaks only occur every 10 years, community-based forecasting is still worthwhile. In these low-risk areas though, communities might not see the value.

The accuracy of forecasts is good. The simple system means that nearly all forecasters record data and follow the rule for working out the forecast correctly.

Not least, communities gain confidence and begin to help themselves in other ways. For example, some have bought sprayers to rent to farmers, others have organised contracts for spraying crops. Links between village and district extension officers and farmers also become closer as they work together to defend against the devastation armyworm outbreaks can cause.

How can I find out more?

For more information please contact the RIU Programme, NR International, Park House, Bradbourne Lane, Aylesford, Kent, UK, ME20 6SN, **riuinfo@nrint.co.uk**.

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Photo: D. Grzywacz

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About this series

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