

CROP PROTECTION PROGRAMME

**Identifying the factors causing outbreaks of armyworm as
part of improved monitoring and forecasting systems**

R No 7966 (ZA No 0449)

FINAL TECHNICAL REPORT

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Annex 11

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Annex 11. Documents accompanying the community-based forecasting pack

Day, R.K., Mushobozi, W. and Holt, J. (2002).

- Title page (Kiswahili)
- Contents of pack (English)
- Contents of pack (Kiswahili)
- Overview of forecasting activity (English)
- Overview of forecasting activity (Kiswahili)
- Moth trap instructions (English)
- Moth trap instructions (Kiswahili)
- Rain gauge instructions (English)
- Rain gauge instructions (Kiswahili)
- Data recording and forecasting sheet (English)
- Data recording and forecasting sheet (Kiswahili)
- Armyworm information leaflet (English version)

Kuangamiza Viwavijeshi



Mvomero

ARMYWORM FORECAST PACK

The Armyworm Forecast Pack contains the following items:

- Armyworm moth trap
- Two rubber baits in an airtight bottle
- Dawa for the trap
- Armyworm moth trap instruction sheet
- Rain gauge, rain collection cup and measuring cylinder
- Rain gauge instruction sheet
- Forecasting instruction sheet
- Data sheets
- Pens, pencils
- Outbreak record cards
- Armyworm posters
- Armyworm leaflets



MFUKO WA MAAGIZO YA KUTABIRI VIWAVIJESHI

Mfuko huu wa maagizo ya namna ya kutabiri viwavijeshi uko na vifaa vifuatavyo:

- Mtego wa nondo
- Mipira miwili ya manukato
- Sumu ya kuua nondo
- Maelezo ya kuutumia mtego
- Kipima mvua, kikombe cha kuinga mvua na silinda ya kupima
- Maelezo ya kutumia kipima mvua
- Maelezo ya kutabiri viwavijeshi
- Fomu maalumu za kujaza
- Kalamu na penseli
- Karatasi za kurekodi kipindupindu cha viwavijeshi
- Ukurassa unaoelezea viwavijeshi



FORECASTING ARMYWORMS

1. EQUIPMENT

The following equipment is needed by the armyworm forecaster. Instructions for the trap and rain gauge are provided separately.

- Armyworm moth trap, bottle of Dawa, and spare bait
- Rain gauge
- Data file with data sheets

2. RECORD DATA EVERY DAY

- Make observations at the same time every morning
- Record the date
- Check the moth trap, and record the number of moths caught
- Check the rain gauge, and record the rainfall

3. CALCULATE FORECAST EVERY FRIDAY MORNING

- Record data on Friday morning as usual
- Fill in the summary table on the data sheet
- Calculate the forecast
- Record on the data sheet if you give an armyworm warning



4. PUBLICISE WARNING

If you give an armyworm warning, you must tell the people who need to know. This must be agreed with the village leaders. Either you or somebody else should make sure the following people know as soon as possible that there is an armyworm warning.

- The village leaders
- The Bwana Shamba
- The local school
- The local mosque, church
- Farmers in the village



5. ASSIST DISTRICT OFFICE

From time to time someone from the district office will visit to see how the forecasting is going. When they come, please assist by letting them see the data file. You should inform them of your experiences as a forecaster, any ideas you have for improving the forecasting.

If you have any problems, you should inform the bwana shamba immediately.

UTABIRI WA VIWAVIJESHI

1. VIFAA

Vifaa vifuatavyo vinahitajika na anayetabiri viwavijeshi. Melezo ya kutumia mtego na kipima mvua yametolewa pengine.

- Mtego wa nondo, kimpira cha manukato na sumu ya kuuu nondo
- Kipima mvua
- Faili lenye fomu maalumu za kurekodi

2. WEKA REKODI KILA SIKU

- Angalia mtego na kipima mvua kila asubuhi wakati sare kila siku
- Rekodi tarehe
- Angalia mtego, hesabu idadi ya nondo walionaswa na urekodi
- Angalia kipima mvua na urekodi kiasi cha mvua

3. FANYA UTABIRI KILA IJUMAA ASUBUHI

- Angalia mtego na kipima mvua na urekodi kama kawaida ijumaa asubuhi
- Jaza sehemu ya ufupisho kwenye fomu maalumu ya kurekodi
- Fanya utabiri
- Rekodi kwenye fomu maalumu ya kurekodi ikiwa umetoa utabiri



4. TANGAZA UTABIRI

Kama umetabiri kwamba viwavijeshi watatokea, ni lazima uwajulishe watu wote. Ni muhimu mkubaliane juu ya utabiri na uongozi wa kijiji. Wewe au mnayetoa utabiri naye lazima muwajulishe watu wafuatao haraka iwezekanavyo.

- Viongozi wa kijiji
- Bwana shamba
- Mkuu au mwalimu yeyote wa shule
- Imamu wa msikiti au anayetoa ibada kanisani
- Wakulima wenzako



5. SHIRIKIANA NA UONGOZI WA WILAYA

Mara kwa mara, maofisaa kutoka wilayani watamtembelea ili kuona vile hii shughuli ya utabiri inavyoendelea. Wanapomtembelea, shirikiana na wao kwa kuwaonyesha fomu ambazo zimejazwa. Pia ni vizuri kujadiliana na wao, uwaeleza shida zinazokupata wakati wa utabiri ili mbandilishane mawazo vile mnavyoweza kuzitatua.

Ukiwa na shida yoyote, wasiliana na bwana shamba bila kuchelewa.

USING THE ARMYWORM MOTH TRAP

1. SETTING UP THE TRAP

- Select a secure area not too close to a building.
- Hang the trap up about 1-1.5m from the ground
- Put in one of the rubber baits (save the other for later use)
- Put a few drops of Dawa on the cloth inside the trap
- Make sure the trap will not be disturbed by animals or children



2. CHECK THE TRAP EVERY DAY

- Look inside and count how many moths there are
- Record on the data sheet the date and the number of moths
- Throw the moths away
- Leave the trap ready again



3. ADD DAWA EVERY TWO WEEKS

- Put a few drops of Dawa on the cloth inside the trap
- Record that Dawa was added
- Leave the trap ready again



4. CHANGE THE BAIT AFTER TWO MONTHS

- Keep the spare bait in an airtight bottle
- Keep the bottle in a cool, dry, safe place
- Replace the bait after two months of use
- Throw away the old bait
- Record that the bait was changed
- Leave the trap ready again



5. PACK UP EQUIPMENT AT THE END OF THE SEASON

- Forecasting stops on 31st March
- Store the trap with the village leaders
- Record that the trap was stored



MAELEZO YA KUTUMIA MTEGO WA NONDO

1. KUANDAA MTEGO

- Chagua maeneo yanayofaa yasiyo karibu na jengo
- Ng'ing'iniza mtego mita moja au mita moja na nusu kutoka chini
- Weka kimpira kimoja cha manukato (hifadhi kimpira kingine kwenya chupa kwa matumizi ya baadaye)
- Nyunyizia sumu kidogo kwenye kitambaa kilicho dani ya mtego
- Hakikisha kwamba mtego hausubuliwi na watoto au wanyama



2. ANGALIA MTEGO KILA SIKU

- Angalia ndani ya mtego kila siku na uhesabu nondo walio ndani
- Rekodi katika fomu maalumu za kurekodi tarehe na idadi ya nondo
- Tupa nondo waliokwenye mtego
- Acha mtego tayari kunasa nondo wengine



3. ONGEZA DAWA KWA MTEGO KILA WIKI MBILI

- Kila wiki mbili nyunyizia ndawa kidogo kwenye kitambaa kilichoko ndani ya mtego
- Rekodi kwamba ndawa imeongezwa
- Acha mtego tayari kunasa nondo wengine



4. BADILISHA KIMPIRA CHA MANUKATO KILA MIEZI MIWILI

- Weka kimpira kisichotumika kwenye chupa au mkebe na ufunike
- Weka chupa au mkebe mahala abapo pamekauka, hapana joto na ni salama
- Badilisha kimpira kilicho kwenye mtego baada ya miezi miwili
- Tupa kimpira ambacho kimetumika
- Rekodi kwamba kimpira kimebadilishwa
- Acha mtego tayari kunasa nondo wengine



5. WEKA MTEGO VIZURI BAADA YA MSIMU WA VIWAVIJESHI

- Utabiri wa viwavijeshi unaisha Machi tarehe thelathinini na moja
- Toa mtego na upeleke kwa ofisi ya kijiji
- Rekodi kwamba umeweka mtego kwa ofisi ya kijiji



USING THE RAIN GAUGE



1. SETTING UP THE GAUGE

- Select an area near the armyworm moth trap away from trees and buildings
- Make a small hole in the ground, for the lower part of the metal container to stand in
- Place the water collection cup inside the metal container
- Put the lid on the metal container
- Make sure the gauge will not be disturbed by animals or children

2. CHECK THE GAUGE EVERY DAY

- Open the lid of the metal container
- Lift out the water collection cup
- Pour the water into the measuring cylinder
- Record on the data sheet the rainfall in mm.
- Throw the rainwater away
- Replace the collection cup and rain gauge lid



3. PACK UP GAUGE AT THE END OF THE SEASON

- Forecasting stops on 31st March
- Store the rain gauge with the village leaders
- Record that the gauge was stored



MAELEZO YA KUTUMIA KIPIMA MVUA



1. KUANDAA KIPIMA MVUA

- Chagua mahali karibu na mtego wa nondo na mbali na majengo au miti
- Chimba shimo ndogo chini na uweke upande wa chini wa kifaa cha chuma cha kipima mvua kwa shimo
- Ingiza kikombe cha kuinga mvua ndani ya kifaa cha chuma cha kipima mvua
- Funika
- Hakikisha kwamba kipima mvua hakisubuliwi na watoto au wanyama

2. ANGALIA KIPIMA MVUA KILA SIKU

- Fungua kifuniko cha kifaa cha chuma cha kupima mvua
- Inua kikombe cha kuinga maji
- Mwaga maji kwenye silinda ya kipima
- Andika kiasi cha mvua kwenye fomu maalumu ya kurekodi kwa kipimo cha milimita
- Mwaga maji uliyopima
- Rudisha kikombe cha kuinga maji na kifaa cha chuma na uache kipima mvua tayari kuinga mvua tena



3. WEKA KIPIMA MVUA VIZURI BAADA YA MSIMU WA VIWAVIJESHI

- Utabiri wa viwavijeshi unaisha Machi tarehe thelathinini na moja
- Toa kipima mvua na upeleke kwa ofisi ya kijiji
- Rekodi kwamba umeweka kipima mvua kwenya ofisi ya kijiji



ARMYWORM FORECASTING WEEKLY DATA SHEET

A. Daily data

| Day | Date | Number of Moths | Rain (mm) |
|-----------|------|-----------------|-----------|
| Saturday | | | |
| Sunday | | | |
| Monday | | | |
| Tuesday | | | |
| Wednesday | | | |
| Thursday | | | |
| Friday | | | |

B. Summary

| | |
|---|--|
| Total number of moths caught this week | |
| Number of days with more than 5mm rain | |
| Is there vegetation suitable for armyworms (Yes/No) | |

C. Making the Forecast

| | | |
|---|---|---|
| 1 | Is there any vegetation suitable for armyworms THIS week? | YES <input type="checkbox"/> Go to number 2 NO <input type="checkbox"/> Go to number 7 |
| 2 | Did you catch more than 30 moths THIS week? | YES <input type="checkbox"/> Go to number 3 NO <input type="checkbox"/> Go to number 4 |
| 3 | Did you get more than 5mm rain on any day THIS week? | YES <input type="checkbox"/> Go to number 6 NO <input type="checkbox"/> Go to number 4 |
| 4 | Did you catch more than 30 moths LAST week? | YES <input type="checkbox"/> Go to number 5 NO <input type="checkbox"/> Go to number 7 |
| 5 | Did you get more than 5mm rain on any day LAST week? | YES <input type="checkbox"/> Go to number 6 NO <input type="checkbox"/> Go to number 7 |
| 6 | <i>GIVE AN ARMYWORM WARNING!</i> | <input type="checkbox"/> |
| 7 | <i>Do NOT give an armyworm warning this week</i> | <input type="checkbox"/> |

D. Other observations

FOMU YA KUREKODI VIPIMO VYA KILA WIKI

A. Vipimo vya kila siku

| Siku | Tarehe | Idadi ya nondo | Mvua (mm) |
|----------|--------|----------------|-----------|
| Jumamosi | | | |
| Jumapili | | | |
| Jumatatu | | | |
| Jumanne | | | |
| Jumatano | | | |
| Alhamisi | | | |
| Ijumaa | | | |

B. Ufupisho

| | |
|--|--|
| Idadi ya nondo walionaswa wiki hii | |
| Idadi ya siku zenye mvua isiyopungua milimita tano | |
| Kuweko kwa mazao yanayoliwa na viwavijeshi (Ndiyo au la) | |

C. Utabiri

| | | Weka alama | |
|---|--|--------------------------------|---------------|
| 1 | Kuna mazao yanayofaa kuliwa na viwavijeshi wiki HII ? | NDIYO <input type="checkbox"/> | Nenda namba 2 |
| | | LA <input type="checkbox"/> | Nenda namba 7 |
| 2 | Ulinasa zaidi ya nondo thelathini wiki HII ? | NDIYO <input type="checkbox"/> | Nenda namba 3 |
| | | LA <input type="checkbox"/> | Nenda namba 4 |
| 3 | Ulipata mvua zaidi ya milimita tano siku yoyote wiki HII ? | NDIYO <input type="checkbox"/> | Nenda namba 6 |
| | | LA <input type="checkbox"/> | Nenda namba 4 |
| 4 | Ulinasa zaidi ya nondo thelathini wiki ILIYOPITA ? | NDIYO <input type="checkbox"/> | Nenda namba 5 |
| | | LA <input type="checkbox"/> | Nenda namba 7 |
| 5 | Ulipata mvua zaidi ya milimita tano siku yoyote wiki ILIYOPITA ? | NDIYO <input type="checkbox"/> | Nenda namba 6 |
| | | LA <input type="checkbox"/> | Nenda namba 7 |
| 6 | TOA TAARIFA YA KUWEKO KWA VIWAVIJESHI! | <input type="checkbox"/> | |
| 7 | <i>Usito taarifa kwani hakutakuwa na viwavijeshi wiki hii</i> | <input type="checkbox"/> | |

D. Matazamo zaidi

Step 4. Killing Armyworms

It is best to kill armyworms when they are small, before they destroy your crops. If you know a way to kill them that works, use it! The most effective way to kill armyworms is to spray Dawa. This is expensive, but it is worth it. If spraying is done properly it kills the armyworms before they get big enough to destroy your crops. Neighbouring farmers must agree to work together to kill the armyworms, as the armyworms can walk from one shamba to another.

The village owns some sprayers. The bwana shamba can tell you how you can make use of them. If there is no Dawa in the village, someone should go to the nearest shop as soon as the small armyworms are seen or when the forecaster gives a warning that outbreaks are coming.



Spraying Dawa kills armyworms and saves your crops

Armyworm Questions

Do armyworms eat all crops? No. Armyworms eat maize, sorghum, millet, rice, sugarcane, wheat, barley and grass. They **do not** eat beans, vegetables, tea, coffee, groundnuts, cassava, cotton.

What colour are armyworms? The very small armyworms are whitish, with a black head. They become green as they eat the green leaves. When they get older, they may turn darker green, brown or black, especially if there are very many. The head is always shiny black.

Why do armyworms disappear so suddenly? When armyworms become full grown, they burrow into the ground and turn into pupae. The adult moths emerge from the pupae and fly away during the night.

Will the government provide Dawa when I get armyworms in my shamba? Unfortunately, no. Farmers must buy their own Dawa, so there is no point in waiting and hoping that Dawa will be provided.

Dawas are expensive. Is it worth using them? If you have more than 2 armyworms on a maize plant, it is better to buy Dawa and spray. Otherwise your crop will be destroyed.

Are Dawas safe? They are safe if you use them properly. Make sure you follow the instructions.

If you have any more questions, ask the bwana shamba.

Further information can be obtained from:

DALDO Kilosa
P.O. Box 65
Kilosa
☎ 2623380

or

Armyworm Coordinator
P O Box 7473
Arusha
☎ 027 2553249 / 2553383

Defeating the Armyworm



English Version

Danger!

Armyworms are dangerous to crops! They appear very suddenly in large numbers. In a short time they can destroy whole fields of maize, sorghum, millet or rice. This leaflet explains how to defeat armyworms. Everyone in the village must know what to do. There are 4 steps to defeating armyworms.

1. Understanding armyworms.
2. Knowing when armyworm outbreaks are coming.
3. Noticing the small armyworms before they become large enough to damage crops.
4. Killing armyworms.

Step 1. Understanding armyworm



Armyworm larva (life size)

The large black armyworms that eat crops are the young of a moth. The moths fly at night, and lay tiny eggs on leaves. Small armyworms hatch out of the eggs and start eating. As the armyworms grow, they become more obvious, and eat more and more.



Armyworm moth (life size)

Armyworm moths can fly long distances, helped by the wind. And one moth can lay hundreds of eggs. This is why armyworm outbreaks can be very sudden.

By understanding armyworms, it is possible to know when outbreaks are coming.

Step 2. Knowing when armyworms are coming

Armyworm outbreaks can be expected when 3 things happen:

- Armyworm moths fly into the area. This can be known from special traps, which catch only armyworm moths.



- There is heavy rain.

Armyworm Moth Trap



- There are suitable plants for the armyworm moths to lay eggs on.

Working out when an armyworm outbreak is coming is called 'forecasting'.

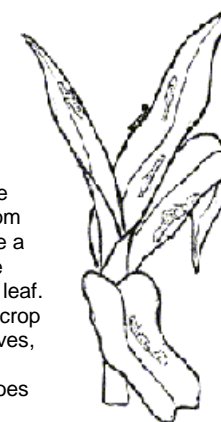
Forecasting will be done for the whole village by a farmer in the village. To do forecasting, training and equipment is required. When armyworm outbreaks are expected, a warning will be given.

The armyworm warning helps you to know when to look for the small armyworms in your fields.

Step 3. Noticing young armyworms

Small armyworms are difficult to see, so you have to look very carefully. They are very small and green, and do not look like full-grown armyworms. Small armyworms can be noticed in two ways.

- Feeding marks. Small armyworms scrape the surface of the leaf. This makes small 'windows' in the leaves.
- Hanging from leaves. If young armyworms are disturbed, they hang from the leaf on a thread, like a spider. Several may be seen hanging from one leaf. If you walk through the crop and rub against the leaves, you may find the young armyworms on your shoes or clothes.



If you see small armyworms in your field, you should show the bwana shamba immediately. Do not delay!

Noticing armyworms in your shamba when they are still small gives time to make preparations for killing them.