

## **Annex 10**

### **Windows Armyworm Database and Interface WADI**

#### ***Version Beta 1***

The Version Beta 1 is not a finished product and is not for distribution. It is ready for active testing by the national forecasting service in Tanzania. WADI is an Access 2000 database for the collation and storage of Armyworm *Spodoptera exempta*, data. The database is provided as a set of copies, one for each season from 01/02 to 13/14. Each copy has the appropriate season indicated on the start-up page and is set up to identify that any data being entered are of the correct date for the year in question. Copies for earlier seasons are also provided to allow outstanding data from previous years to be entered. Double clicking the file for appropriate season runs the database and brings up the start-up screen.

#### ***Start-up***

The start up screen (Fig. 1) has three buttons, one to open the database, one giving information about the provenance of the software and its function (Fig. 2), and one giving details of the authors (Fig. 3).

The first two items on the main menu (Fig. 4) are the most important: making a forecast and entering and viewing information. First we discuss 'entering and viewing information'. This is divided into six different actions: enter weekly trap data, enter monthly trap data, enter CCD data, enter outbreak data, enter/view trap station data, enter/view districts (Fig. 5).

#### ***Weekly trap data entry***

To enter weekly trap data it is necessary to specify the trap and the week concerned (Fig. 6). The current traps appear as a drop down list from which one can be selected. The week is given by default according to the current date (called the reference date on the screen shown in Fig. 6), but this can be changed by the user. The weekly trap data are usually received by the national forecaster the week after they are collected. In the example shown (Fig. 7), the trap Kilosa Kilimo was selected for the default date. An empty table is displayed with seven records, in this case 12 April to 18<sup>th</sup> April inclusive. The trap weeks run from Monday to Sunday. The number of moths caught each day in the trap and the rain recorded each day in the rain gauge (mm) have been entered as an illustration.

It can be seen in the illustrative data that relatively low moth catches occurred on Monday, Tuesday, Saturday and Sunday, whilst relatively high catches occurred on Wednesday, Thursday and Friday. There were a few millimetres of rain on Tuesday and Wednesday but substantial rainfall occurred on Friday. Armyworm outbreaks are most likely when 'high' trap catches and rainstorms occur with a few days of each other. The traps signal the arrival of adult moths and the rainfall that the appropriate conditions may occur for vegetation growth to feed the developing larvae. The definition of a high trap catch varies

from trap to trap. This gives rise to the so-called trap factor (see later), a figure which indicates what might be regarded as a high trap catch. Clearly, such trap calibration can only be done after a trap has been operating for a period.

The other columns of the form shown in Fig. 7 have been left blank. In some cases, a trap station has no rain gauge and rain can be entered as 'yes', 'no' or 'trace'. Incidence of outbreaks in that week can also be recorded whilst their details are records elsewhere (see below). Whether or not the rain gauge was operating can also be recorded.

### ***Monthly trap data entry***

The weekly trap data form is where initial data entry is intended to take place, usually the week after the events occur. These records are conveyed to the national forecaster by telephone or radio and are the data on which the forecast is based. The trap operators also send cards to the national forecaster with written copies of the data. Each card contains one month's data. These cards give the definitive record for historical purposes. In some cases there are errors in transmitting the weekly data verbally and also there are occasions when the trap operators are unable to make their weekly report. The monthly cards therefore allow gaps in the data to be filled and errors corrected.

The monthly trap data form (Fig. 8) is provided for this purpose and for ease of use is set out in the same way as the cards. Whilst the default reference date for the weekly trap data entry is one week after the trap catches, the reference date for the monthly data is one month after the trap catches. The monthly trap data form is automatically populated as the weekly data are entered. Monthly trap data entry is therefore a process of error checking and gap-filling. In Fig. 8, the reference date has been set one month hence to show that the data entered in Fig. 7 have been brought forward to the monthly form.

Form updating is deliberately one-directional: the weekly updates the monthly but not the other way round. In this way the weekly data form keeps a copy of the data from which the forecast was actually made. In any forecast evaluation activity it is clearly important to keep this distinct from the corrected and possibly more complete monthly data which is assembled after the event.

### ***CCD data entry***

Because both the trap and rain gauge data from a single station give only single point measurements, extrapolation of this information to make a forecast for a district may not be very reliable. To obtain a more general picture of rainfall conditions, it is useful to compare rain gauge with satellite-derived rainstorm information. Rain is associated with storm clouds, the tops of which are at high altitude and appear very cold on Infra-red Meteosat channels. These data can be summarised as cold cloud duration (CCD) for particular coordinates, this being the number of hours for which those coordinates were covered with cold cloud.

For the purposes of armyworm forecasting (see Section \*\*\*\*\*) the CCD are integrated over a district and a maximum daily value obtained for each district on each day. The values are available weekly on a web site and can be stored in WADI using the weekly CCD data form (Fig. 9). The dates correspond to the weekly trap data and some data have been entered for illustrative purposes. The CCD value for Kilosa for Friday was quite high at 8 hours. This indicates that the Kilosa Kilimo rain gauge provided, in this case a representative picture for the district as a whole.

### ***Forecast form***

This is accessed as the first item on the main menu (Fig. 4). The purpose of the forecasting form is to bring together the different sources of data available to the forecaster at the time of making the forecast. These are the weekly trap data giving moth catch and rain gauge information for each trap and the weekly CCD data for the district. In the example shown (Fig. 10) data for two traps in Kilosa district are shown, together with the CCD data for that district. Whilst the Kilimo trap gave a high trap catch, the Ilonga trap did not. The Ilonga rain gauge also gave significant rainfall but on different days to the Kilimo rain gauge. Under such circumstances the armyworm outbreak forecast for Kilosa would probably be judged by the forecaster to be 'high', with significant risk of armyworm outbreaks in some locations in the district. The forecast for that district in that week is entered on the top right of the forecast form (Fig. 10). The user can then proceed to another district by selecting the name from the drop down menu. The relevant data for that district then appear to allow a forecast for that district to be made.

### ***Outbreak reporting***

WADI has the facility to store armyworm outbreak information and an example of a completed form (Fig. 11) shows the details that can be stored. Using the built-in functions of Access, the outbreaks table and, indeed the other data tables, can be interrogated using queries. Outbreak data entry is accessed from the 'enter / view information menu' (Fig. 5).

### ***'House-keeping'***

The remaining items in the 'enter / view information' menu are the 'house-keeping' operations of maintaining the list of traps, and when administrative changes occur (as happened recently), districts. The minimum information required for a new trap is the district in which it is located. Apart from more detailed spatial information, there is also an opportunity to record a trap factor for the trap as well as whether it is part of the national trap network (Fig. 12).

The community-based traps that have been set up and run by community groups are not part of the national forecasting network and do not report their data to the centre on a weekly basis. Data for these traps are being recorded, however, as they will be needed to monitor and improve the performance of the community forecasting. WADI also provides a suitable platform for the management of the data from the community-based forecasting.

Of the other items on the main menu (Fig. 4) 'Re-open introduction page' and 'Exit this database' are self-explanatory. 'Preview reports' is not yet operational. There are a number of ways that the data might need to be summarised in a routine way for purposes of report-writing which would come under this item. Editing of the menus can be carried out under 'Change Switchboard items'.

### ***List of ANNEX 11 figures***

Fig. 1 Start up screen

Fig. 2 About WADI

Fig. 3 Contributors

Fig. 4 Main menu

Fig. 5 Enter / view information

Fig. 6 Information from the trap operators, received on a weekly basis

Fig. 7 Example data from the trap Kilosa Kilimo

Fig. 8 Weekly data forwarded to monthly forms for filling gaps and correcting errors

Fig. 9 Meteosat satellite derived daily cold cloud duration data for each district entered weekly

Fig. 10 Weekly forecast issued for each district after comparing data from different sources

Fig. 11 Details of outbreaks are recorded when they are reported

Fig. 12 New trap stations can be added with their details

Fig. 1 Start up screen

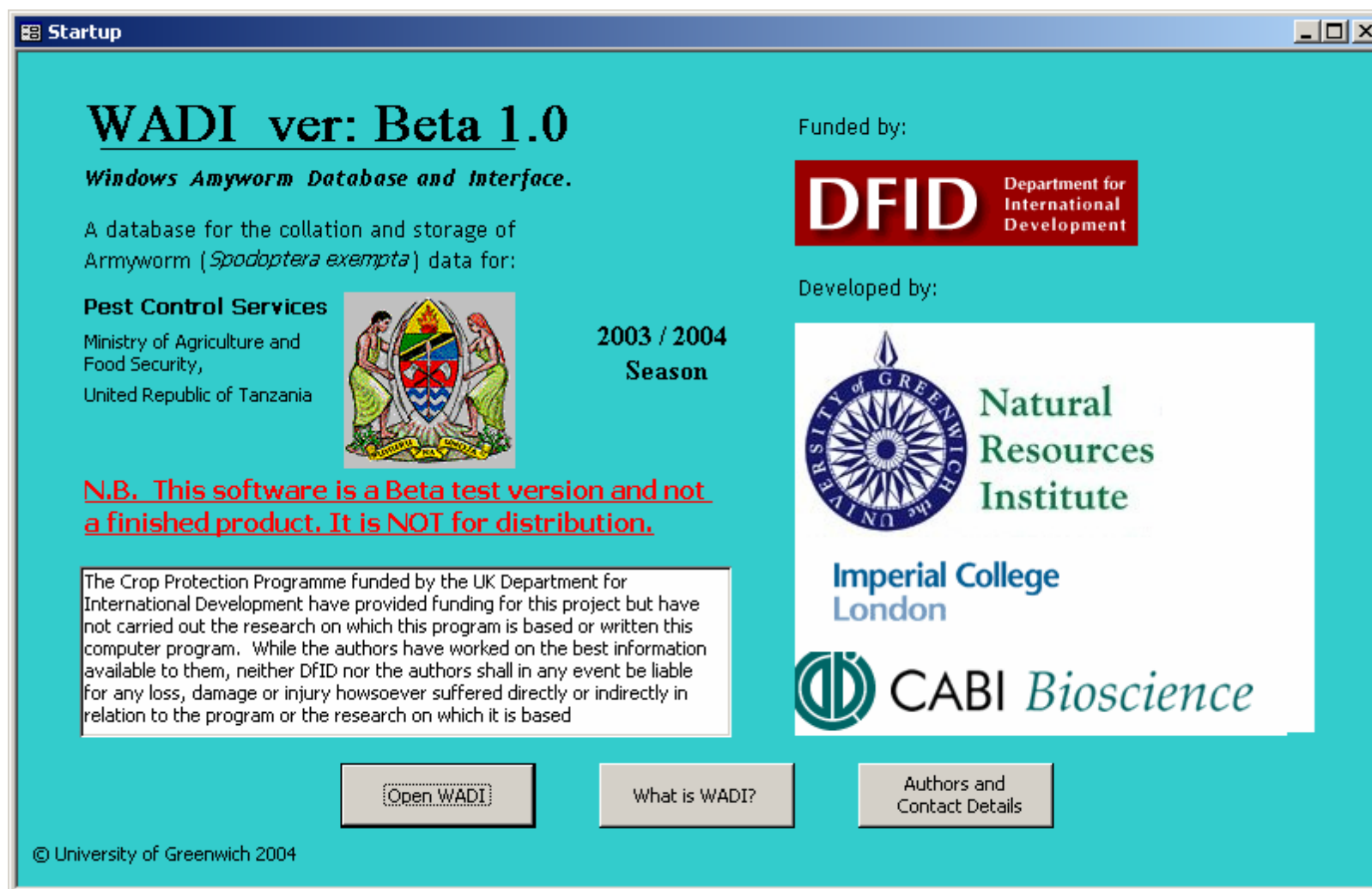


Fig. 2 About WADI

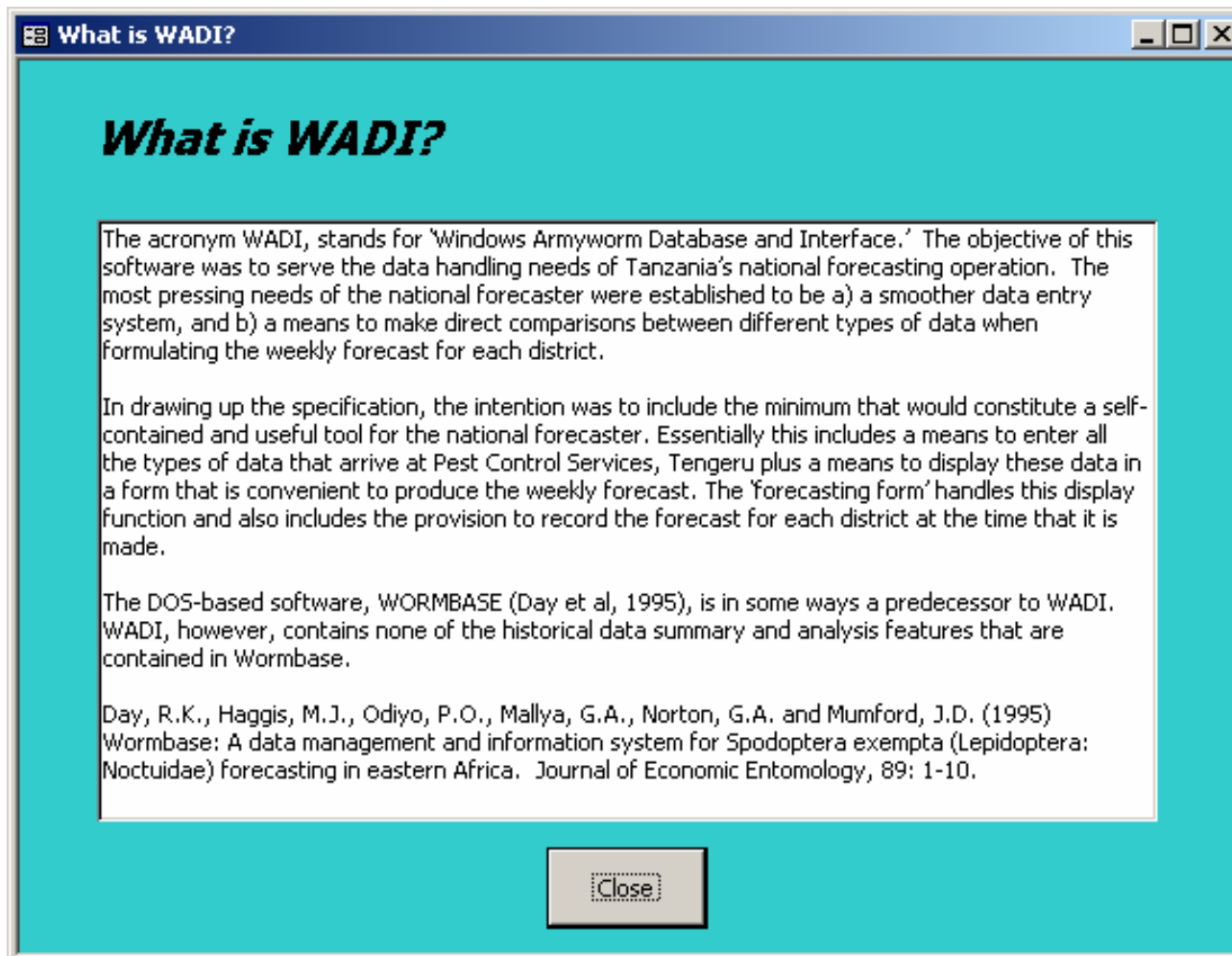


Fig. 3 Contributors

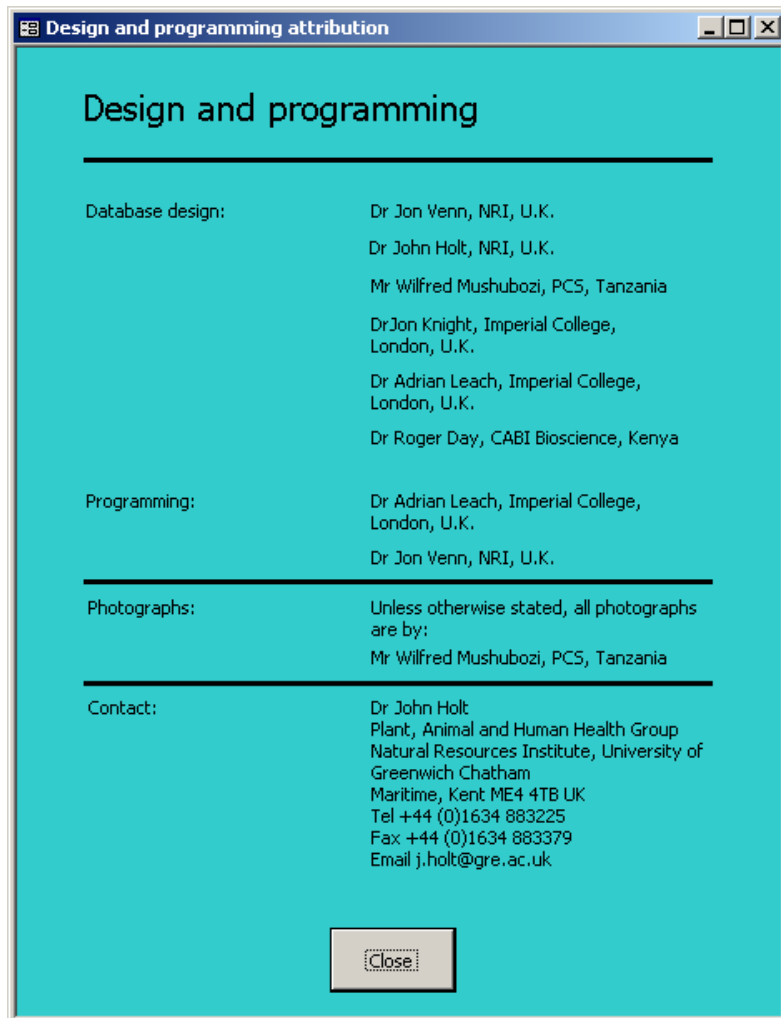


Fig. 4 Main menu

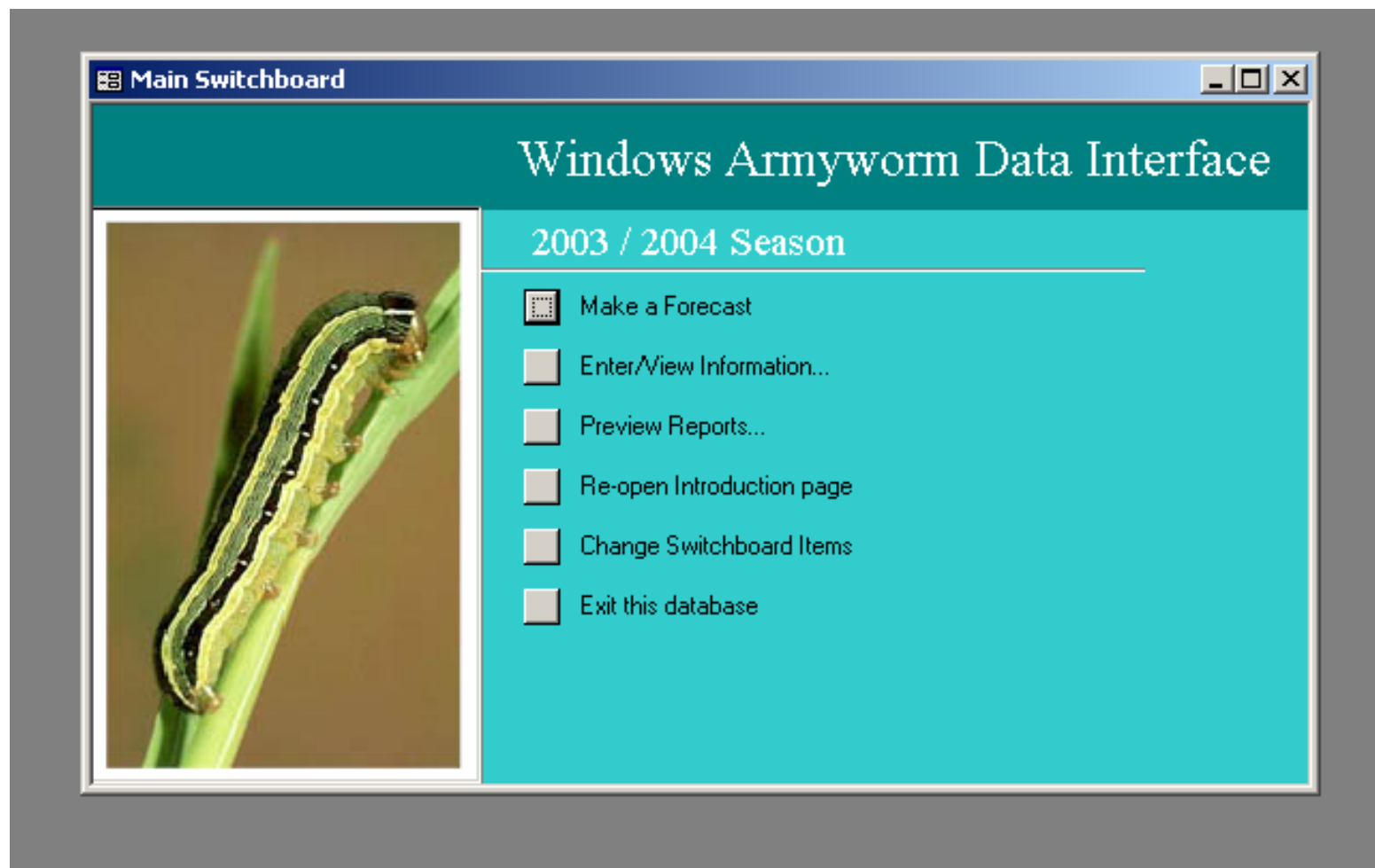


Fig. 5 Enter / view information



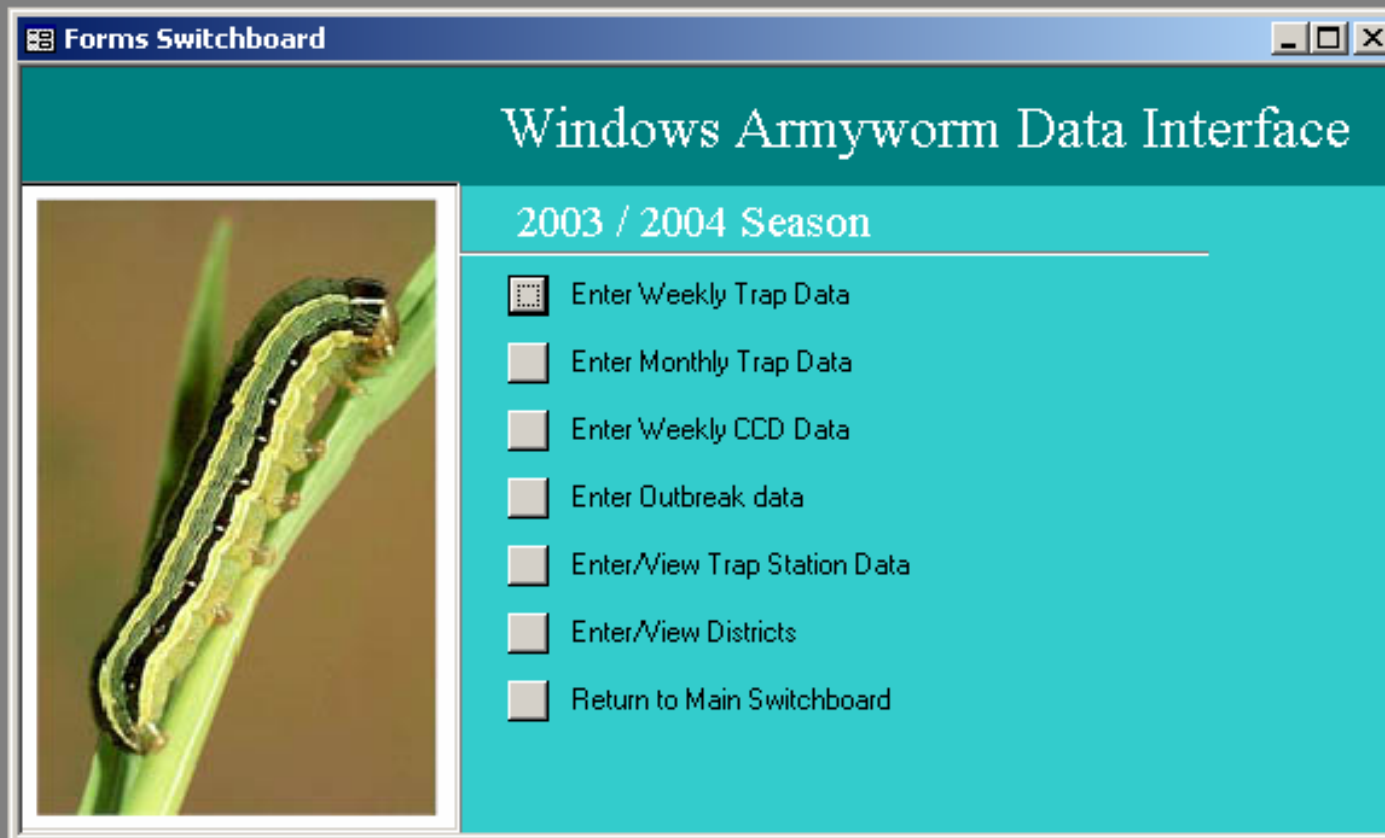


Fig. 6 Information from the trap operators, received on a weekly basis

Weekly Trapdata - New Data : Form

## Enter Weekly Trapdata

For Trap  
in District  
& Region

Trap Name

Reference date

Week beginning  for the Month of **April 2004**

Monday  
Tuesday  
Wednesday  
Thursday  
Friday  
Saturday  
Sunday

**FIRST CHOOSE TRAP**




Fig. 7 Example data from the trap, Kilosa Kilimo

**Weekly Trapdata - New Data : Form**

## Enter Weekly Trapdata

For Trap **Kilosa Kilimo**  
 in District **Kilosa**  
 & Region **Morogoro**

Trap Name:

Reference date:

Week beginning:  for the Month of **April 2004**

	DataDate	No Moths	mm Rain	Rain y/n	Outbreak	Rain gauge
Monday	12/04/2004	6	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tuesday	13/04/2004	2	5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wednesday	14/04/2004	56	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Thursday	15/04/2004	32	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Friday	16/04/2004	89	43	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Saturday	17/04/2004	1	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sunday	▶ 18/04/2004	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>





Fig. 8 Weekly data forwarded to monthly forms for filling gaps and correcting errors

Monthly Trapdata - New Data : Form

## Enter Monthly Trapdata

Trap Name: 
 For Trap: **Kilosa Kilimo**  
 Reference date: 
 in District: **Kilosa**  
 Month beginning: 
 & Region: **Morogoro**

for the Month of **April 2004**



Day	DataDate	No Moths	mm Rain	Rain y/n	Outbreak	Rain gaug	Day	DataDate	No Moths	mm Rain	Rain y/n	Outbreak	Rain gaug
▶ 1	01/04/2004	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	▶ 16	16/04/2004	89	43	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	02/04/2004	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	17	17/04/2004	1	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	03/04/2004	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	18	18/04/2004	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	04/04/2004	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	19	19/04/2004	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	05/04/2004	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	20	20/04/2004	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	06/04/2004	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	21	21/04/2004	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	07/04/2004	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	22	22/04/2004	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	08/04/2004	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	23	23/04/2004	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	09/04/2004	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	24	24/04/2004	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	10/04/2004	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	25	25/04/2004	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	11/04/2004	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	26	26/04/2004	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	12/04/2004	6	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	27	27/04/2004	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	13/04/2004	2	5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	28	28/04/2004	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	14/04/2004	56	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	29	29/04/2004	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	15/04/2004	32	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	30	30/04/2004	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ADI\_beta ...

Fig. 9 Meteosat satellite derived daily cold cloud duration data for each district entered weekly

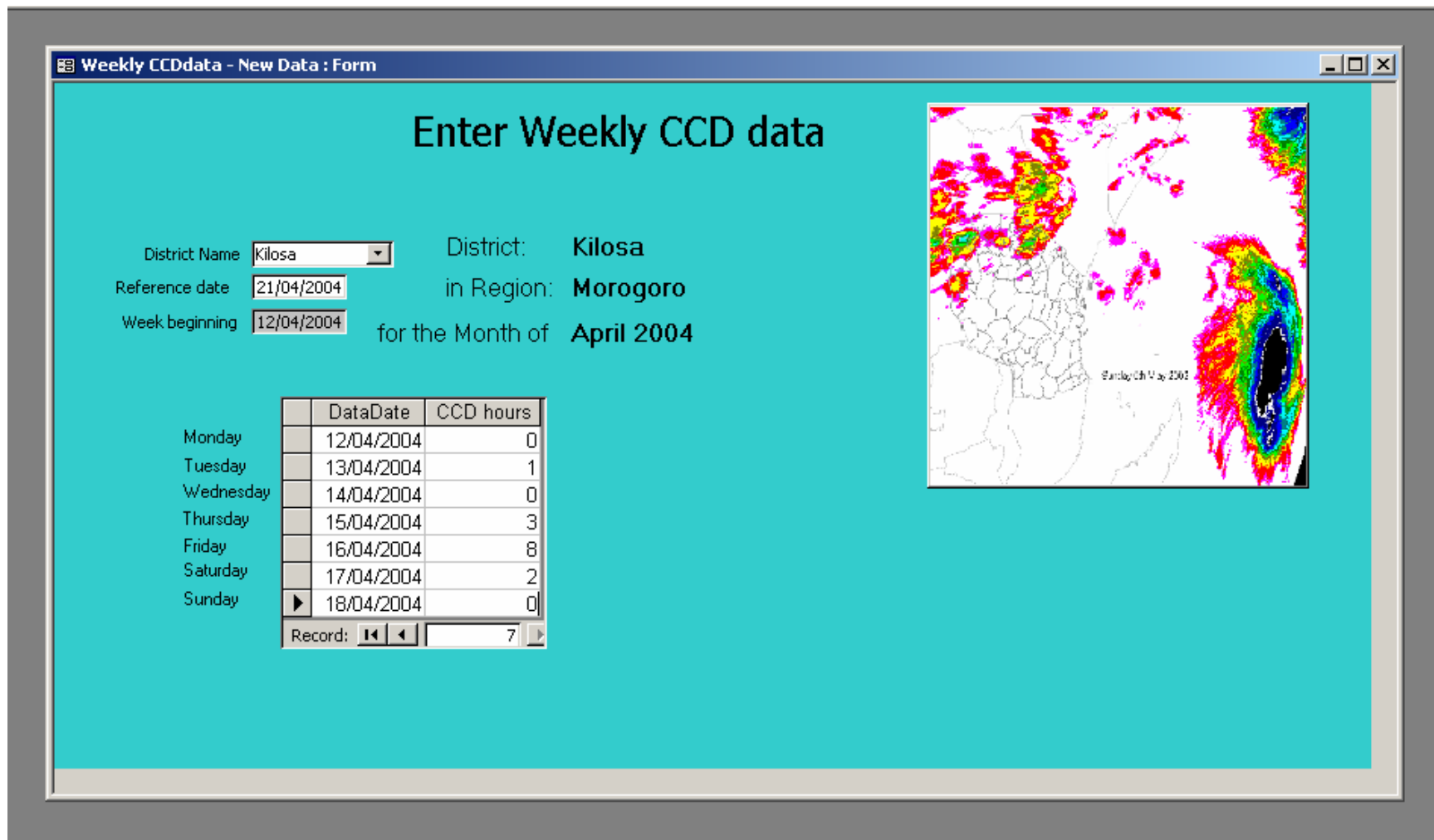


Fig. 10 Weekly forecast issued for each district after comparing data from different sources

Forecast Form

Today 21/04/2004 **FORECAST FORM**

Trap / CCD data is for week beginning Monday 12/04/2004

Forecast is made on Friday 23/04/2004 for district

**Choose a District or Exit**

Forecasts made (can delete or edit)

Dname	Forecast
Kilosa	high
*	

Trap name	Monday		Tuesday		Wednesday		Thursday		Friday		Saturday		Sunday	
	Moths	Rain	Moths	Rain	Moths	Rain	Moths	Rain	Moths	Rain	Moths	Rain	Moths	Rain
Kilosa Kilimo	6	0	2	5	56	2	32	0	89	43	1	0	0	0
Ilonga	2	0	5	3	10	56	3	5	9	32	0	0	1	7
April	12	0	13	1	14	0	15	3	16	8	17	2	18	0

Month    day    CCD    day    CCD    day    CCD    day    CCD    day    CCD    day    CCD    day    CCD






Fig. 11 Details of outbreaks are recorded when they are reported

**Outbreak Data Input**

Outbreak data input Region Mbeya

Outbreak no 1 District Mbeya

Village Songwe

Ward Songwe Viwandani

Division Iwindi

Season ID 2003/2004

Date received 17/11/2003

Date seen 17/11/2003

Reported by Extension officer

Larvae stage 5

Crop Infested Maize and Grass

Crop Area infested in Ha 112

Population Density/plant 0

Population Density/M2 0

Action taken controled

Pesticide used Sumithion

Formulation EC

Quantity in litres 0

Application methods Knapsack sprayer

Crop loss in Ha 0

Record: 1 of 1




Fig. 12 New trap stations can be added with their details

**Trap Station Information**

Trap Station Information

Trap Name

District

Village

Ward

Division

Lat degrees

Lat minutes

Long degrees

Long minutes

Network

Trap factor

Record:        of 67