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Arming against the Armyworm:

"The Recurring Problem"

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Summary

The armyworm outbreak of 1996 covered more than 246,186 hectares in seven regions, of which 201,021 hectares were cropland. Chemical control measures were applied on 93,634 hectares using 92,900 lt/kg of pesticides. Assuming a cost of USD 7/liter, the direct cost of control to the government is calculated to be over $650,000. Additional direct costs include staff per diem and vehicle costs. Even though outbreaks were largely controlled in cases of serious infestations, crop damage and diversion of personnel increase substantially the true cost of the 1996 armyworm control campaign.

The present report discusses several issues including recurring outbreaks, early warning, pesticide distribution and the logistics of control operations. It also lists current training requirements as well as suggestions for better inter-regional coordination of outbreak prediction and control operations. Sources of infestation are explored as a means of reducing the likelihood of recurring outbreaks and the accompanying disruption of Ministry of Agriculture budgets and programmes.

1996 armyworm control operations, costs and crop damage

The 1996 armyworm[1] outbreak covered vast areas of the southern rift escarpments, the Jigjija plains, the eastern mountain slopes and the Tigrean plains. Of the reported 201,021 hectares of cropland infested, control measures were undertaken on 93,634 hectares using 92,900 lt/kg of pesticide (Table 1). Spraying was accomplished employing mostly manual and motorized backpack sprayers. There was no aerial application this year in order to avoid damage to beneficial insects such as honey bees, and to avoid livestock grazing complications. MoA personnel who had been trained by the Department of Plant Protection and the USAID-East Africa Locust and Grasshopper Control Project were generally effective in coordinating the control operation.

The cost of the control operations, excluding crop losses, could be conservatively estimated by extrapolating from the control cost per hectare in sample weredas to that of the entire hectarage. In addition to the pesticide supplied by the central government, the region/zone/wereda along with the National Plant Protection Division had to absorb vehicle, personnel and per diem costs. This posed a problem to the control operation as most agriculture bureaus had not budgeted for pest control and had no cash on hand for these expenses, often delaying the start of control procedures.

Crop damage was minimal in comparison to the 1994 outbreak in that few hectares had to be replanted (1084 hectares), and armyworms were controlled in most areas before crops became

[1] *Spodoptera exempta*

seriously damaged. Farmers were also fortunate that continuous good rainfall suppressed armyworm development and promoted crop and pasture growth and recovery.

Recurring problems and lessons learned

Two of the recurring problems were insufficient numbers of armyworm pheromone moth traps and the unreliable operation of available traps, both of which contributed to the already critical lack of moth report data and outbreak forecasting capability. Although more than 100 moth traps provided by the central Crop Protection Division were deployed throughout the country, many were not operational primarily due to problems with pheromone capsules (either not supplied or no longer effective). Better communication from the trapping site is also needed, as trap data reporting is often late. Data is currently mailed to the zones on a monthly basis and then forwarded to regional and national offices. Because of rapid movement of moths, beyond forming a historical record, this data is of little use in forecasting outbreaks and initiating control. Sites should be selected based on their strategic role in forecasting outbreaks and should be capable of immediately reporting the rise in moth catch. A nightly catch of more than 20 moths signals an outbreak within 5-7 days in the locality, and should be immediately phoned or radioed to control headquarters. Traps should be located accordingly to facilitate communication of impending outbreaks.

Although the number of regional personnel trained in control procedures has increased, in the Somali Region, at least, most wereda staff need additional training. In this region judicious safety procedures were exhibited, most likely as a result of previous training. Rather than sending chemicals to inexperienced wereda staff, spraying teams with a trained leader were dispatched to the weredas. Such a procedure facilitated survey of damage and determination of spraying requirements, reduced misuse and improper application, and enabled effective control of operations. However, the number of teams deployed to the affected areas was insufficient and teams suffered from a serious shortage of vehicles. Moreover, the field teams lacked communication services and had no contact with the central control offices to report progress, extent of damage and further need of supplies. The initiatives taken by the regional authorities in tackling the outbreak should be commended as an example for future interventions.

Since aerial application was not used and truck mounted sprayers were deployed with difficulty, backpack spraying capabilities were stretched in the Somali Region. Because of heavy rainfall and scattered crop fields, truck-mounted sprayers were less applicable and efficient. If infestations had been more extensive and had included secondary outbreaks as occurred in 1994, backpack coverage would not have been sufficient and extensive crop damage would have occurred. Planning and capacity will become more critical as crop production intensifies in the region.

In general, although initiatives and cooperation between central, regional and local authorities was sufficient for armyworm control this year, the outbreak management structure of the Ministry of Agriculture needs clarification. It appears that the central Plant Protection Division intends to maintain pesticide stocks in the central stores and dispatch chemicals, advisors/overseers and some small funds to affected areas, most likely to the zonal level. However, the organisation of the control operation as well as associated costs appear to have become the financial responsibility of the regional, zonal and wereda governments.

Recommendations for reduction of future outbreaks and associated costs

Although on marginal lands the cost of pesticides is barely recovered by the value of agricultural crops, it may be that with increased investment in agriculture inputs, such as improved seeds and fertiliser, control measures will become more economically feasible.

The following recommendations are suggested as possible ways to improve coordination of armyworm control measures, minimise costs and losses, and to provide the farmer with the most economical means of controlling infestations:

- The role of government agencies at each level, and their management strategy needs to be more clearly defined. This planning at each level is important if limited resources are to be used effectively and efficiently.

- Since spraying operations need to begin soon after outbreaks, officials need to make more efficient use of backpack sprayers, and contingency plans to move sprayers should be formulated, either to move them from a central store or from unaffected weredas to severely affected ones.

- With the increasing cost of damage related to improved inputs, central stores need to plan for appropriate pesticides supplies and need to reduce the lag time between outbreaks and shipment of chemicals to affected areas. Rural stores are not appropriate for holding large amounts of chemicals. However, most affected zones are accessible by truck within three days, and shipping preparations should be made upon the report of migrating moths.

- Pheromone traps should be more strategically positioned to facilitate timely reporting and subsequent dispatch and initiation of control operations. Traps should be placed in areas with communication facilities, and trap operators should be instructed in the supreme importance of daily surveillance and immediate reporting of moth migrations into the area. Currently moth traps are sent to the region/zone with untrained personnel being responsible for location assignment, deployment, operation and reporting.

- Means for efficient use of sprayers among the thousands of farmers covered by a few sprayers should be explored. Motorized ULV sprayers can cover a hectare of crop in 15 minutes so each sprayer could cover 30-40 hectares per day; this entails coordination among an approximate 100 farmers for each day of sprayer use.

- Sources of infestations and moth movement patterns need additional study as a means of limiting extent of outbreaks. Moths are reported to originate from solitary infestations on the Kenya/Tanzania border as well as the Somali coast. However, this year there were no outbreaks in Kenya and the moths could not have crossed strong wind currents parallel to the track of the Ethiopian outbreaks. This suggests that the source of propagation occurred in southwest Ethiopia and can be attributed to vegetation resulting from periodic rainfall or irrigation in southwest Ethiopia.This possibility is further supported by the continuous catch of low numbers of moths and early outbreaks in the southwest early in the cropping season. (Table 2). There is therefore a need for information on:

    1. The occurrence of solitary larvae in grassy and irrigated areas of southwest Ethiopia.

    2. The relationship of solitary larvae to the occurrence of the first outbreaks in Ethiopia which usually occur in the Southwest.

    3. The role of these and adjacent country outbreaks and their effect on the pattern of moth movement and the occurrence of subsequent outbreaks.

    4. The possibility of reducing widespread outbreaks by control of solitary and first outbreaks in the Southwest.

The Desert Locust Control Operation (DLCO) seems to have been reduced to providing support services and administration to the operation of survey and control aircraft. Already in 1997, DLCO has given notice they will not provide the phermone trap capsules produced by the National Research Institute of England, which is a mere cost of 2,000 Birr. However, it would appear that with the current funding, DLCO could become more involved in inter-regional and international forecasting, possibly including the above study.

Table 1.Extent of Armyworm infestation and Chemicals Used in Ethiopia During the 1996 Outbreak and Control Operations

Region	*Date First Reported*	*Pasture Infested*	*Ha Crop Infested*	*Chemical Used Lt/Kg*	*Ha Crop Damaged*
Tigray	May-25	9,427	47,171	22,147	421
Amhara	May-20	10,778	70,934	39,354	663
Oromya	Apr-17	24,960	30,131	16,637	-
Somali	May-17	-	47,865	7,651	-
SNNPRG	Apr-27	-	3,191	3,499	-
Dire Dawa	May-21	-	1,920	1,791	-
Harar	Apr-27	-	3,000	1,821	-
Total			45,165	210,021	1,084

Table 2. Frequency of armyworm male moth catches in phermone traps during early stages of the 1996 outbreaks (by dekads).

Dekad/Location	*Feb 1st*	*Feb 2nd*	*Feb 3rd*	*Mar 1st*	*Mar 2nd*	*Mar 3rd*	*Apr 1st*	*Apr 2nd*	*Apr 3rd*
Dimeka			14						
Jinka		4	5						
Burji		2	2		1				
Derashe					5	34			
Konso				2	7	9			
Amaro									39
Arba Minch								87	149
Alaba								17	
Wanago						6			
Dire Dawa			6						
Abobo								65	39

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