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INTEGRATED PEST MANAGEMENT FOR SUSTAINABLE COTTON PRODUCTION IN UGANDA

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ABSTRACT

Cotton is the most important fibre crop in Uganda and its role as a foreign exchange earner is likely to increase in the foreseeable future. One of the major constraints to higher cotton production is pest problem. Integrated Pest management (IPM) was recently introduced to develop sustainable, safe and cost effective package for the control of cotton pests. The successful generation and transfer of suitable IPM package for cotton farmers would require extensive research, training and on-farm demonstrations. This paper addresses the above issues and presents some of the achievements, challenges and future prospects.

KEY WORDS: Cotton, IPM, Technology transfer/generation, Uganda

INTRODUCTION

Cotton production in Uganda is not only important as a cash crop but also as a land opener in the farming system. In the early 1970's Uganda ranked third behind Egypt and Sudan in cotton production among African countries. Cotton was then the most important export crop after coffee and accounted for 23% of export earnings. The crop however, faced a terrible decline from an average annual peak of production of 78,000 metric tones of lint between 1969-1973 to a mere 7,000 metric tones of lint between 1979-1983 (Anon., 1991).

Cotton a crop which used to be grown by thousands of smallholder farmers in north and north east was greatly affected by the severe security related restrictions until recently.

The Government initiated an economic recovery program in 1987 supported by several donors. It also intends to continue to improve the infrastructure supporting transport, processing and marketing of agricultural products in particular cotton.

Pest control is one of the major constraints of cotton production in Uganda. Chemical control which is the most frequently used strategy is done on a "calendar basis". This recommendation dates from the early 60's and insecticides are at present haphazardly used by the farmers (Anon., 1993). As part of the

Government effort, and in consideration of environmental and public health concerns it has recognized the benefits of including the concept of IPM in its strategy. In principle, an IPM system incorporates several methods of controlling pest populations such as biological control, host plant resistance, culture practices, mechanical control and chemical control.

Over the last two years work on Integrated Pest Management has been initiated in most of the cotton growing areas of Uganda. The major objective is to develop sustainable, safe, cost effective IPM package for controlling major pests of cotton. Work has so far focussed on research, training and on-farm demonstrations. This paper presents some of the achievements, challenges and future prospects for promotion of the IPM system.

ACHIEVEMENTS

(a) Research

To implement any meaningful IPM program, the following are preliquisites:

(i) Acquisition of quantitative information about the cotton agro-ecosystem,

(ii) Establishment of Action threshold levels as an option for farmers to wisely use pesticides.

Work has therefore been carried out to generate information on the following aspects:

(1) Basic Field Data.

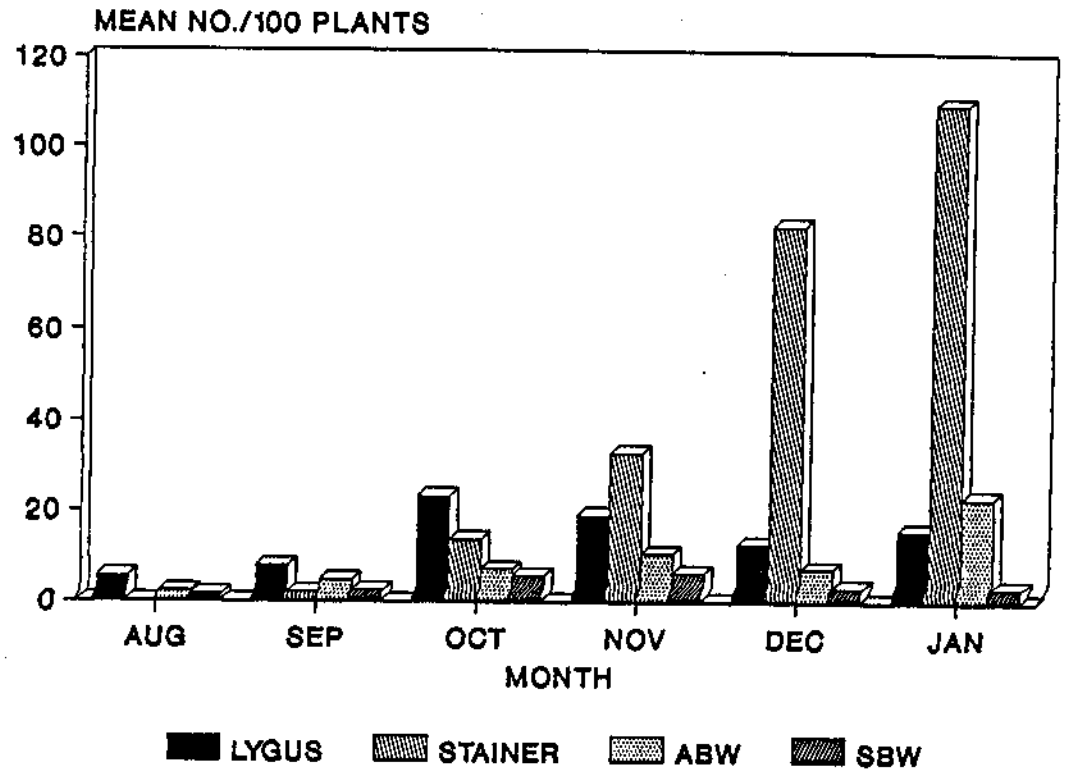
Collecting basic field data on cotton plant, pests and natural enemies populations through scouting techniques and monitoring by use of sex pheromone traps. Data obtained has established:

(a) the growth patterns of the commercial cotton varieties (types) SATU and BPA

(b) that lygus, bollworms (American, spiny),and stainers are the primary pests of cotton. Their seasonal incidence has also been determined (Fig. 1).

(c) the seasonal abundance of natural enemies particulary predators (Fig. 2) associated with cotton pests. A total of 8 groups of predators. Also, over 30 species of parasitoids (still under identification), and a number of unidentified pathogens have been recorded (EL-Heneidy et al.,1995).

Fig. (1): Monthly mean numbers of key pests / 100 plants at NAARI (BPA area) and SAARI (SATU area).



NAARI,94

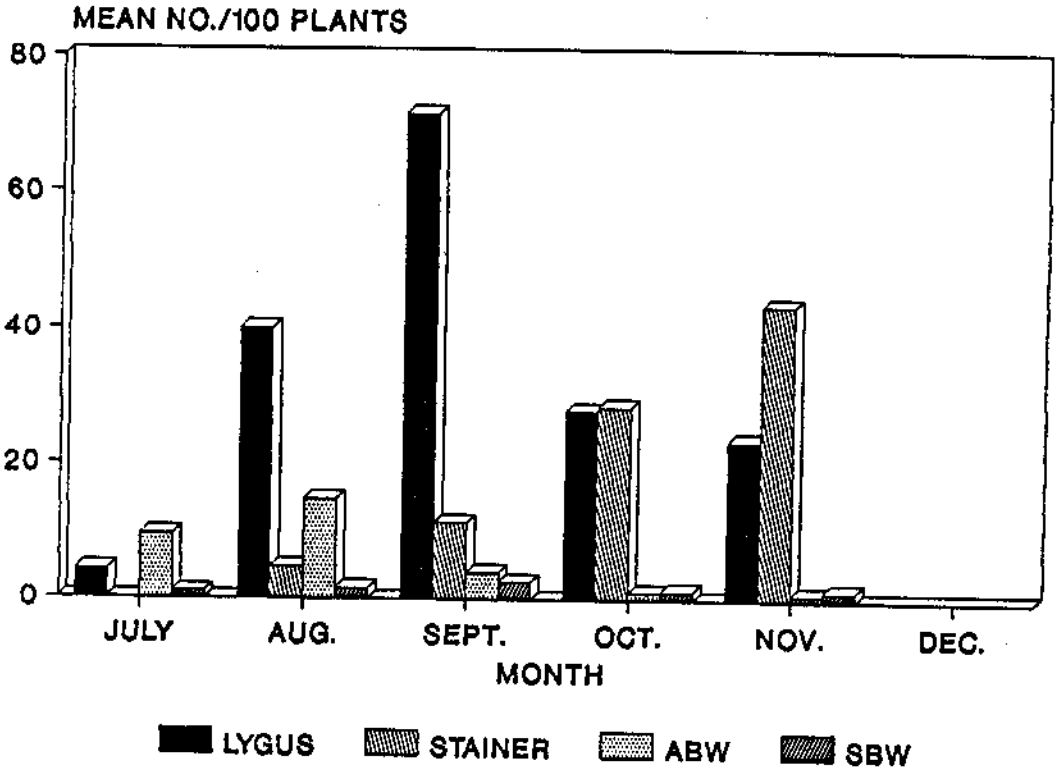
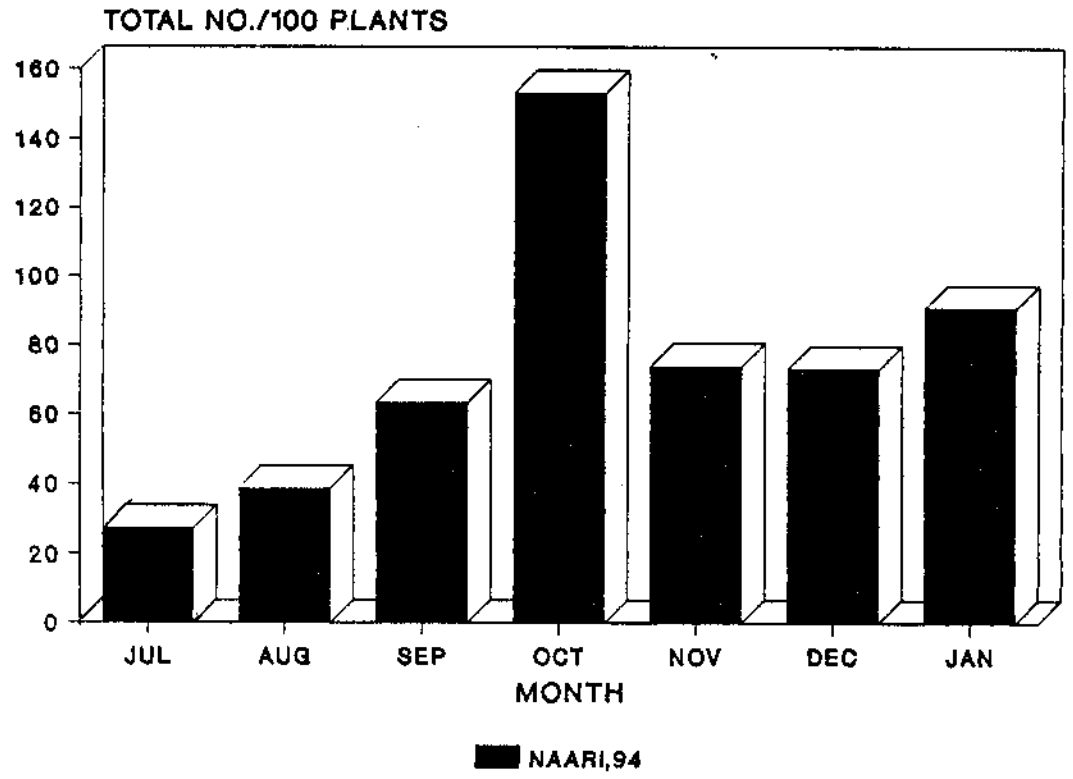
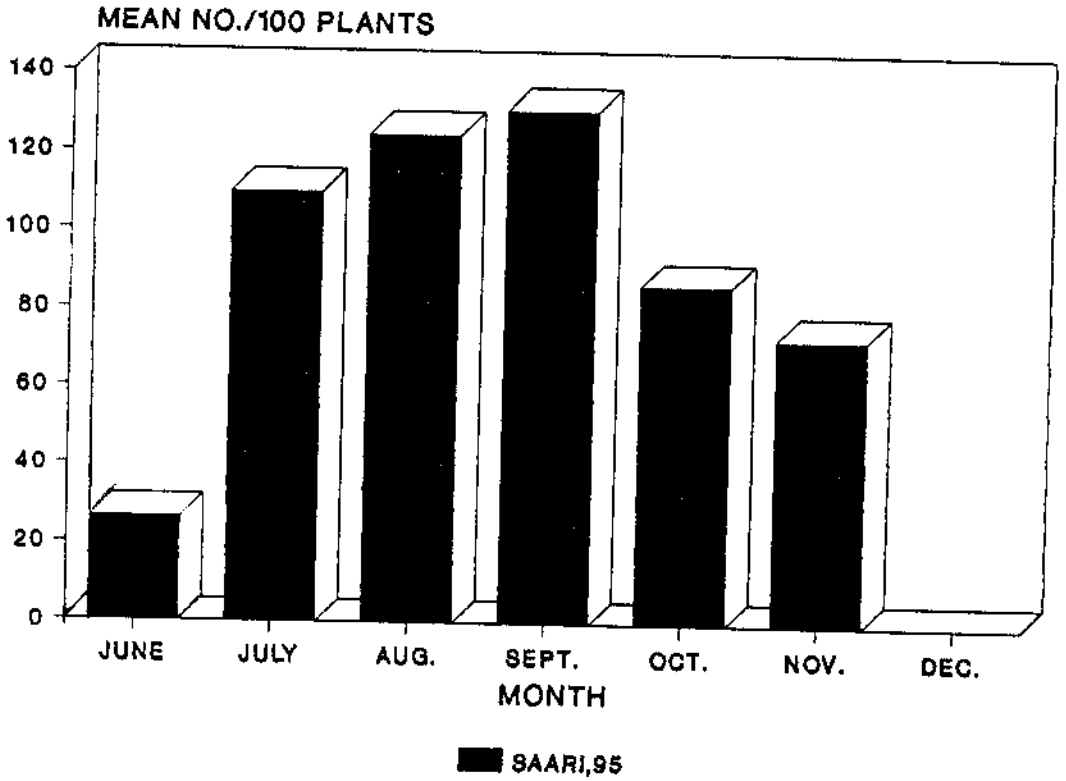


Fig. (2): Monthly mean numbers of total predators / 100 plants at NAARI (BPA area) and SAARI (SATU area).





(2) Trap crops.

Manipulation of agro-ecosystems through use of trap crops (Montadon and Slosser, 1994), mixed cropping (Taylor, 1977) has been found to be beneficial in cotton pest management. We therefore tested the influence of crop mixtures on the incidence of cotton pests and their natural enemies. Pests and predator data obtained from the various crops during 1994 and 1995 seasons are presented in Table 1. Obtained results indicate that correct cultural practices may help to control some pests and save farmers from heavy use of insecticides.

It is evident from table 1 that maize is more attractive to bollworms, sorghum to lygus and data not presented in the table, "malakwany" to stainers. These studies also reveal that planting interval among crops is a very critical factor in the trapcropping system (EL-Heneidy and Sekamatte, 1995a).

(3) Action Threshold Levels

Generally, pest management decision making is very dependent on appropriate Action threshold Levels (ATLs). That is, the pest population level at which some management action usually application of insecticides, is required to prevent irrecoverable economic losses. Action thresholds for lygus and bollworms the major pests of cotton were determined (Table 2).

Table (2): Number of insecticicde sprays, chemical groups and yield of seed cotton in Action Threshold Level (ATL) trials planted at Kigumba (Masindi) and Namulonge during 1993/94 and 1994/95 seasons, respectively

1993/94				1994/95			
Plot	No. sprays	chemical group	Yield kg/ha	Plot	No. sprays	chemical group	Yield kg/ha
Routine	4	Py	595	lygus	2	Py+Op	1450.0
ETL	2	Py	575	BWs	2	Py	1137.3
Control	0	_	295	Control	0	_	485.5

Three ATLs were tested for each of the major cotton pests. The values tested in the first season were obviously high and hence lower yields of seed cotton were obtained. In the second season, when lower values were used, and improvements on the scouting techniques done (El-Heneidy and Sekamatte, 1995b), significant increases in yields were obtained with less insecticide sprays (Table 2).

Table (1): Monthly means of pests and predator populations per 50 plants in Cotton, Maize, Sorghum and Beans planted at Namulonge and Serere during the 1994/95 and 1995/96 cotton seasons, respectively

PESTS/ PREDATOR	COTTON			SORGHUM			MAIZE			BEANS		
NUMBER	July	Aug.	Sept.	July	Aug.	Sept.	July	Aug.	Sept.	July	Aug.	Sept.
PESTS												
- LYGUS												
Namulonge	5.4	12.0	38.0	98.0	123.0	177.0	1.8	2.4	0.0	2.4	1.0	0.0
Serere	0.0	1.0	17.0	1.5	184.5	318.0	0.0	1.5	3.0	-	0.0	0.0
- ABW												
Namulonge	0.0	0.6	2.7	0.6	0.0	0.1	0.8	0.8	3.0	0.0	0.0	0.0
Serere	0.0	0.2	3.0	0.5	0.0	0.0	0.0	2.0	0.0	-	0.0	0.0
- SBW												
Namulonge	0.1	0.3	5.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serere	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0
PREDATORS												
Namulonge	31.0	27.0	43.5	54.0	56.0	33.0	110.0	108.0	204.0	43.0	68.0	56.0
Serere	13.5	22.6	47.8	50.0	92.5	159.5	108.0	257.5	182.5	-	11.0	20.5

(4) Screening of insecticides and applicators

Insecticides are one of the major components of IPM. Therefore up-to-date information on the most effective and environmentally safe insecticides as well as efficient application technology is necessary. New promising insecticides for controlling cotton pests are shown in Table 3 **(Sekamatte and EL-Heneidy, 1995 and Sekamatte and Okoth, 1995).**

Table (3): Chemical name, type, mode of action and comparative performance against target pests of recently tested insecticides for cotton

Chemical name	Type	Main mode of action	Comparative efficacy against target pests:			
			Lygus	Bollworms	Aphids	Stainers
Salut	OP	systemic	**	**	***	**
Decis	SPY	contact	***	**	*	***
Sherpa DL	SPY	contact	***	***	**	***
Azofas	SPY+OP	contact/ systemic	**	***	**	***

* = Low efficacy; ** = Moderate efficacy; *** = High efficacy

(b) Training

Training is crucial for the successful generation and transfer of technology. IPM in particular requires a team of well trained staff including policy makers, scientists, technicians, extension agents and farmers. Through workshops, seminars and public media, IPM information generated under the research component has been transferred to several categories of beneficiaries as indicated in Table 4.

(c) DEMONSTRATION PLOTS

To facilitate faster adoption, IPM technologies need to be practically demonstrated sufficiently closer to the client (farmer). In the past three years therefore, demonstration plots were sited at Technology Verification Centers (TVCs) and on farmers' fields at Kasese, Masindi, Namulonge, Kumi, Soroti and Lira. Consequently, several new and more efficacious chemicals have been successfully adopted for use by farmers (Table 3). Their application using the newly developed and recommended micron sprayer has recently been demonstrated to farmers **(Sekamatte and Okoth, 1995)**. To ensure judicious use of the chemicals, established Action thresholds (ATLs) based on simple scouting techniques have also been demonstrated in most of the areas named above.

Table (4): Technical and practical courses conducted during 1993 - 1995 in various places to transfer IPM information

Target group	No. of courses	No. of participants	Venue	Duration	Course content
I- IN- COUNTRY					
Farmers only	1	450	Kasese	1 day	- Introduction to practical IPM.
PPOs, Researchers, Technicians	3	95	NAARI,SAARI	2 days	- Cocept of IPM - Intercropping - Spray technology, IPM - Achievements at SAARI
PPOs + Farmers	3	84	Kasese,NAARI, SAARI	6 days	- Introduction to IPM - Scouting techniques, - Identification of pests & natural enemies -& Safe use of chemicals, - Field practicals
Technicians + Extension staff	2 seasons	30	NAARI,SAARI, Kasese,Masindi Kumi,Soroti	14 mos	- Efficient data collection - Scouting techniques,pests and natural enemies - Identification,ATLtrials - Safe use of chemicals.
&II - OUT OF COUNTRY					
PPOs	1	12	Egypt	2.5mos	- IPM general
Researcher	1	1	USA	2.0mos	- IPM general

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CHALLENGES

Inspite of the achievements attained during the last three years, a number of constraints limit the full realization of the benefits. For example,cotton is often produced in environments where haphazard growing of various crops renders it more vulnerable to pests. This is due in part to lack of proper policy guidelines on the cultural practices. Problems of this laxity are many: sell expired chemicals, non observance of crop hygiene, rotation, cotton seed handling, non observance of close season, all influencing higher pests incidence. On the other hand, the recent placement of the chemical statute is a move in the right direction but will require vigorous efforts to enforce. Such constraints exist at both technical and non technical levels.

At the technical level, policy and infrastructural aspects are key. There is urgent need to incorporate IPM in the agriculture Act to address policy issues particularly those related to cotton. For example, the current laxity in enforcing cotton by-law has significant negative impact on the successful utilization of the cultural component of IPM. Secondly, there should be policy guidelines to define suitable farming systems for the various ecological zones of the country.

At the non technical level, social economic factors principally labor bottle necks greatly limit success of IPM. Cotton production usually experiences unfavourable competition for labor with food crops. The major consequences are late planting, inadequate weeding, improper spraying (often no sprays at all irrespective of the high pests populations), and delayed picking.

FUTURE PROSPECTS

1- The successful implementation of IPM will largely depend on the support of policy makers.

2- There should be intensification of research at the resarch institutes, TVCs and on-farm to generate more information on IPM.

3- Research-Extension-Farmer linkage should be strengthened in order to effectively address IPM related issues.

4- More Extension staff and farmers should be adequetly trained to promote the IPM concept further.

5- More IPM adoptive research plots be established at farm level in order to create more awareness.

6- Timely availability of good cotton seeds, safe and effective chemicals should be ensured.

7- Enhancement of the role of natural enemies through conservation and perhaps augumentation.

Acknowledgement

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