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Research Application Summary

Occurrence and effect of fall armyworm on maize production in Arapai Sub-County, Soroti District, Eastern Uganda

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Abstract

Maize (*Zea mays* L) is ranked among the top three crops cultivated and consumed after bananas and cassava in Uganda. However, maize production is currently endangered by the fall armyworm (FAW) outbreak, which if not controlled causes enormous losses. Moreover, there is still limited knowledge on the status, origin and effects of FAW. This study was therefore undertaken to establish the occurrence of fall armyworm and its effect on maize production, livelihoods as well as ascertain the coping methods used by farmers in Arapai sub-county, Soroti district. The study used an exploratory design to solicit information from 50 respondents. Data were collected using questionnaires and interviews and analyzed using descriptive statistics of SPSS software version 16. Eighty one percent of the respondents reported the occurrence of FAW in their fields. Seventy one percent of respondents reported that the severity of damage was more intense on maize aged two months and above, often resulting in 100 % yield loss. Close to 89% of respondents tried to control FAW using chemicals, although success was with limited. Therefore there is need to sensitize the population on management of FAW as well as establishment of early alert systems for warning against fall army worm outbreaks.

Key words: Fall armyworm, maize, pest control, Soroti, Uganda, yield loss

Résumé

Le maïs (*Zea mays* L) est classé parmi les trois principales cultures cultivées et consommées après les bananes et le manioc en Ouganda. Cependant, la production de maïs est actuellement menacée par l'épidémie de chenille légionnaire d'automne (CLA), qui, si elle n'est pas contrôlée, entraîne d'énormes pertes. De plus, les connaissances sur l'état, l'origine et les effets de la CLA sont encore limitées. Cette étude a donc été entreprise pour établir la présence de la chenille légionnaire d'automne et son effet sur la production de maïs, les moyens de subsistance ainsi que pour déterminer les méthodes d'adaptation utilisées par les agriculteurs d'Arapai, district de Soroti. L'étude a utilisé un plan exploratoire pour solliciter des informations auprès de 50 répondants. Les données ont été collectées à l'aide de questionnaires et d'entretiens et la statistique descriptive générée à partir de la version 16 du logiciel SPSS. Quatre-vingt-un pour cent des répondants ont signalé la présence de la CLA dans leurs champs. Soixante et onze pour cent des répondants ont indiqué que la gravité des dommages était plus intense sur le maïs âgé de deux mois et plus, entraînant souvent une perte de rendement de 100%. Près de 89% des répondants ont essayé de contrôler la CLA à l'aide de produits chimiques, bien que le succès ait été limité. Par conséquent, il est nécessaire de sensibiliser la population à la gestion de la CLA ainsi qu'à la mise en place de systèmes

d'alerte précoce pour prévenir les épidémies de chenille légionnaire d'automne.

Mots clés : légionnaire d'automne, maïs, lutte antiparasitaire, Soroti, Ouganda, perte de rendement

Introduction

Maize (*Zea mays* L) is one of the world's most important cereal crops. In East Africa, it is a major staple food for a large proportion of the population in addition to being an important animal feed. Estimated per capita maize consumption in Uganda is put at 50 g/person/day. Uganda produces close to four million metric tons of maize grain annually making it the third highest crop produced. Maize contributes to the livelihoods of over 3.6 million households (UBOS, 2014). It is estimated that over 70 percent of maize produced is consumed as food (USAID, 2017).

Uganda produces 2.4 million Metric tons (Mt) of maize per year. At regional level, the highest production of maize is from Eastern (1,108,554 MT), followed by Western (497,745 MT), Central (449,859 MT) and lastly Northern (305,798 MT) Uganda (UBOS, 2010). However, maize production is constrained by several biotic, abiotic and social economic factors. The latest outbreak of Fall armyworm (FAW), *Spodoptera frugiperda* (Smith), is threatening maize production in all regions of the country. For instance in 2016, severe outbreak of FAW was reported in the districts of Kasese, Kayunga and Bukedea, among others. A reconnaissance visit made to these districts found that almost 40% of the maize crops in the fields visited were attacked (MAAIF, 2017) by then an unknown pest. However, the National Agricultural Research Organization (NARO) later confirmed the identity of the pest as fall armyworm. This created panic as FAW is known to be a very devastating pest and quite challenging to control (Yu, 1991; Francys, 2002). The potential economic loss due to FAW at continental level in Africa is estimated at between US$2,481m and US$6,187m per year (Phil *et al.*, 2017). In Uganda, up to 40% of maize has been reported lost in 20 western and central Ugandan districts. However, information on occurrence, impact and control measures in many areas in Uganda including Arapai sub-county in Soroti district in eastern Uganda is still not well documented. Yet, the information is vital for policy guidance and action. This was the basis for this study.

Methodology

A survey was conducted in March 2018 in Arapai sub-county in Soroti district. Purposive sampling technique was used to identify study parishes. These were selected on the basis of being the highest maize producers, but had cases of FAW. Questionnaires and interviews were used to collect data from 50 respondents. Quantitative data were analyzed using descriptive statistics using SPSS version 16.0. Qualitative data were presented as themes.

Results

Eighty one percent (81%) of the respondents reported cases of fall army worm on their maize fields. Maize leaves and stem were parts seriously damaged. Close to 70% damage was categorized as severe. An agricultural extension worker when interviewed said "*fall armyworm eats all most everything when the maize plant is still young. Even the cobs when green are eaten*".

On the origin of the pest, 59.3% of the respondents thought that that the fall armyworm originated from

neighboring districts while 41.7% were not sure. The effects of fall armyworm were associated with loss of income and food by over 90% of the respondents. Besides attacking maize, FAW was reported on other crops like finger millet and sorghum by 78% of the respondents . In terms of control, 89% of the respondants attempted to control the pest while the rest did not attempt. The chemical commonly used by the majority of the respondents for the control of FAW was Rocket. However, the effectiveness of the chemical was disputed by 73% of the respondents. The other method reported in the control of the pest was early planting.

Discussion

The occurrence of FAW in Arapai sub-county was associated with severe damage of the maize crops especially crops two and three months old. The origin of the pest was not known although it was suspected to have migrated from the neighboring districts. This was not surprising as the pest had been reported in 2016 in Uganda (Nandudu, 2017). According to MAAIF (2017), the fall armyworm was first detected in Uganda in 2016 in the districts of Kayunga, Kasese and Bukedea, and subsequently in 54 other districts.

The destructive nature and feeding habits of the fall armyworm resulted into complete yield loss. According to MAAIF (2017), feeding and damage by fall armyworm results in yield reduction. Studies elsewhere especially in African countries such as Nigeria, Kenya, Togo, South Africa, Central Africa and Zimbabwe demonstrated that the pest can potentially cause yield losses of up to 20.6 million tons per year (Juli *et al.*, 2017; Phil *et al.*, 2017). According to Johnson (1987), the emerging caterpillars or the larval stage of the pest are aggressive feeders, with the potential to destroy a hectare within 72 hours. In this study, the pest was reported to have destroyed a hectare of young maize within four to five days.

Accordingly, it is estimated that at the current rate of yield loss of between 15%-75% elsewhere, the outbreak of fall army worm in Uganda could lead to loss of revenue amounting to US $ 192 million (MAAIF, 2017). Fall army worm was reported to be destroying other crops such as sorghum and finger millet. According to Julio *et al.* (2017), FAW is a polyphagus and voracious pest. The polyphagus nature of the pest is disastrous because it has the potential to affect biodiversity and ecosystem stability. Majority of farmers used the chemicals (Rockett44EC and Duducyper) for controlling fall armyworm though their effectiveness was disputed. Cultural control (early season planting) approaches were also reported to control FAW. These could be integrated with chemical pesticides in the management of the pest.

Conclusion and recommendations

Fall army worm was wide spread and devastating in Arapai particularly on maize in comparison to other crops. No control methods were reportedly effective probably due to factors still unknown. Therefore, more sensitization is required to make farmers more knowledgeable on control of fall armyworm as well as development of early warning alert systems.

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