

Research Application Summary

The current status of Maize Lethal Necrotic Disease awareness and control in Bomet County, Kenya

Muchemi, P.K.¹, Kamau, W. J.¹, Shem, B.N.¹, Mathew, P. N.² & Mwangi, W. J.²

¹Department of Plant Sciences, Kenyatta University, P.O. Box 43844-00100, Nairobi, Kenya

²Department of Biotechnology and Biochemistry, Kenyatta University, P.O. Box 43844-00100, Nairobi, Kenya

Corresponding author: muchemi.kariuki@ku.ac.ke

Abstract

The study aimed at determining the level of awareness about Maize Lethal Necrosis Disease in Bomet County in Kenya. Random sampling method was used to obtain a sample of respondents from a target household population of maize farmers. Structured questionnaire was used in collection of data and was subjected to R statistical software for analysis. The findings indicated that 54.8% of males were involved in decision making while 45.2% were females. Majority of the respondents 50% had attained their highest level of education as primary students, 35.8% were secondary schools holders, 8.8% had no formal education, while 5.4% had tertiary education level. Most dominant maize variety in Bomet County was DK777 grown by 97.5% of the farmers. It was also observed that a greater percentage of the farmers (77.5%) used crop rotation to control MLND in their farms, 55.0% applied the glow season strategy, 30% preferred clearing the weeds, 27.5% applied intercropping method whereas 22.5% of the farmers in this county applied spraying method to control the disease. There was no significance difference in the maize production between the sub counties (p-value 0.071). The correlation between maize yields and Maize Lethal Necrosis Disease indicated a negative relationship. Most of commercial maize cultivars grown were susceptible to MLND. This research recommended that MLND awareness be carried out in the County. Also, further screening of landraces and other genotypes for possible resistance to *Maize Lethal Necrosis Disease* should be carried out.

Key words: Education, food sustainability, preferred varieties, resistance maize

Résumé

L'étude visait à déterminer le niveau de sensibilisation à la nécrose létale du maïs dans le comté de Bomet au Kenya. Une méthode d'échantillonnage aléatoire a été utilisée pour obtenir un échantillon de répondants d'une population cible de ménages de producteurs de maïs. Un questionnaire structuré a été utilisé dans la collecte de données et a été soumis au logiciel statistique R pour analyse. Les résultats ont indiqué que 54,8% des hommes étaient impliqués dans la prise de décision, tandis que 45,2% étaient des femmes. La majorité des personnes interrogées 50% avaient atteint leur plus haut niveau d'éducation en tant qu'élèves du primaire, 35,8% étaient titulaires d'une école secondaire, 8,8% n'avaient pas d'éducation formelle, tandis que 5,4% avaient un niveau d'enseignement supérieur. La variété de maïs la plus dominante dans le comté de Bomet était DK777 cultivée par

97,5% des agriculteurs. Il a également été observé qu'un plus grand pourcentage d'agriculteurs (77,5%) utilisaient la rotation des cultures pour contrôler la MLND dans leurs exploitations, 55,0% appliquaient la stratégie de saison de l'éclat, 30% préféraient l'élimination des mauvaises herbes, 27,5% appliquaient la méthode de culture intercalaire tandis que 22,5% des agriculteurs de ce comté ont appliqué une méthode de pulvérisation pour contrôler la maladie. Il n'y avait pas de différence significative dans la production de maïs entre les sous-comtés ($p= 0,071$). La corrélation entre les rendements du maïs et la nécrose létale du maïs indiquait une relation négative. La plupart des cultivars de maïs commercial cultivés étaient sensibles au MLND. Cette recherche a recommandé que la sensibilisation au MLND soit menée dans le comté. En outre, un dépistage plus poussé des races locales et d'autres génotypes pour une éventuelle résistance à la nécrose létale du maïs devrait être effectué.

Mots clés : éducation, durabilité alimentaire, variétés préférées, maïs résistant

Introduction

Maize (*Zea mays* L) is one of the food crops cultivated by both small scale and large scale farmers in Kenya (Kang'ethe, 2011). Maize is the main staple food and many farmers in Kenya rely on its products as a source of income (Ministry of Agriculture, Kenya, 2012). However, Maize Lethal Necrosis Disease (MLND) has emerged as an important constraint to maize production in the country. As such efforts towards developing maize varieties in Kenya that are resistant against MLND will be important for ensuring food security in the country.

Most maize varieties were reported to be susceptible to MLND and there appeared to be no complete resistant varieties to be adopted by farmers (Prasanna, 2014). The most preferred and sustainable method toward the management and control of MLND is the use of resistant maize genotypes. The development of maize lines resistant to MLND will depend on breeding elites lines with rich diversities present among landraces and adequate awareness about identification and control of MLND in Kenya. This study therefore determined the level of MLND awareness, and methods used by farmers in managing MLND, and preferred varieties in Kenya.

Materials and methods

The study area was conducted in Bomet County, Kenya. Four Sub-counties were selected covering different agro-ecological zones. Semi structured questionnaire were used to obtain data from respondents on the level of MLND awareness and control in Bomet County. The survey was conducted during both short (September to December) and long rain season (April to August).The data collection involved discussion with key informants (County and sub-county officers) followed by formal interviews with farmers. Information on level of education, varieties grown by farmers, and methods used in control of MNLND were collected during the survey. Other methods included focus group discussion, matrix scoring, and transect walks. The data generated were analyzed using R statistics software model.

Results

According to the study findings 33.3% of the farmers in Sotik Sub-County indicated that they had knowledge of maize varieties resistant to MLND. Amongst these 33.3% of those who responded

positively said that DK777 was resistant to the disease whereas 16.7% indicated that Katumani variety was also resistant to MLND. In Bomet East sub-county 50% of the farmers who participated in the study responded positively to presence of a resistant variety and indicated DK777 maize variety as a resistant. Also 33.3% of the farmers in Bomet Central responded positively to presence of a resistant variety to MLND. Of those who responded positively 25% listed DK777 as a resistant variety whereas 8.3% listed Katumani as one of the maize varieties resistant to MLND. In Chepalungu sub-county 44.4% of those who participated in the study responded positively to presence of a resistant variety and indicated DK777 as the resistant variety. A significant relationship between farmers level of education and farmers' MLND awareness was observed ($r = 0.670$, $p = 0.017$). Lack of significant relationship between awareness of MLND and gender was observed ($P\text{-value}=0.016$, $r = -0.674$).

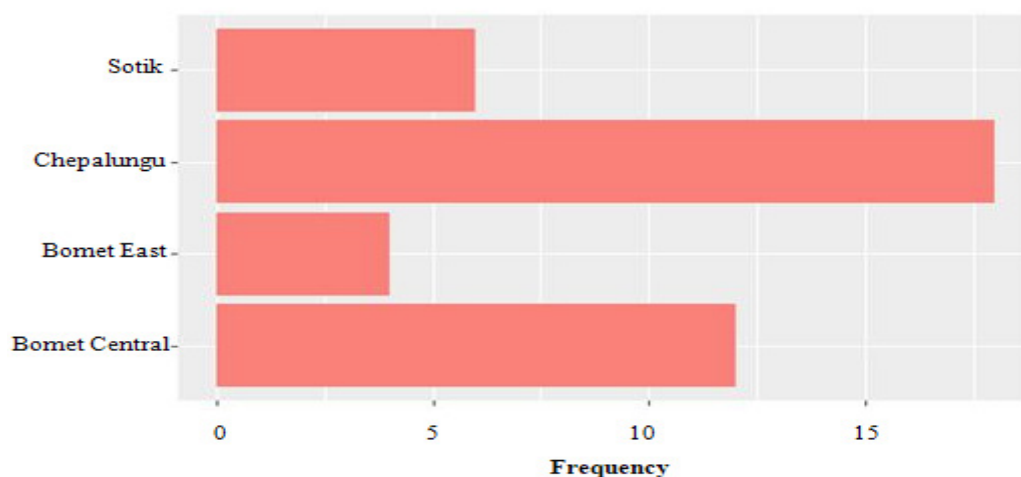


Figure 1. Level of awareness of MLND disease in Bomet County

Chepalungu had the majority of farmers who indicated that they knew about the disease, Bomet Central had the second highest number of farmers who indicated that they knew about the disease, while Bomet East registered the least number of farmers who knew about the disease. There was no significance difference in the maize production between the sub counties ($p\text{-value} 0.084$).

Discussion

The level of education plays a great role in farmers choice of maize of variety, method of controlling disease and management of Maize Lethal Necrotic disease (Wangai, 2012). Majority of farmers with secondary and Tertiary education identified resistant varieties with ease because they were able to access information on the disease management (Taylor, 1997). The findings indicated that there was a significant relationship between farmers level of education and spread of MLND ($r = 0.670$, $p = 0.017$), and relatively, a positive relationship between MLND and farmers level of education (Makone *et al.*, 2014). A negative but significant relationship between awareness of MLND and gender was observed ($P\text{-value}=0.016$, $r = -0.674$) as also reported by Makone *et al.* (2014).

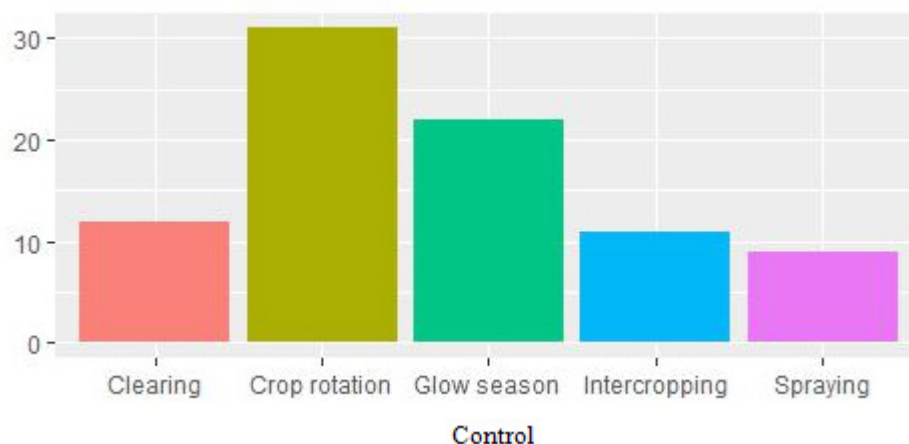


Figure 2. Method of MLND control in Bomet.

Conclusion

The above results show the need to develop varieties resistant to MLND. Further more awareness by extension officers on MLND control should be created and disseminated to farmers.

Acknowledgement

The study was funded by Deutscher Akademischer Austauschdienst (German Academic Exchange Service (DAAD)). This paper is a contribution to the 2018 Sixth Africa Higher Education Week and RUFORUM 2018 Biennial Conference.

References

- Kang'ethe, E. 2011. Situation analysis: Improving food safety in the maize value chain in Kenya. pp. 1–89. FAO.
- Makone, S.M., Menge, D. and Basweti, E. 2014. Impact of maize Lethal Necrosis Disease on maize yield: A case of Kisii, Kenya. *International Journal of Agriculture Extension* 2 (03): 211–218.
- Ministry of Agriculture, Kenya. 2012. Report on status of maize lethal necrosis disease and general maize performance. Joint Assessment Report. Retrieved from <http://www.fao.org>
- Prasanna, B. M. 2014. Update: CIMMYT maize inbred lines and pre-commercial hybrids with potential resistance to maize lethal necrosis (MLN). CIMMYT.
- Taylor, M. 1997. Women's work: Modern women rewrite a farm wife's job description. *Top Producer* 14 (4): 8–13.
- Wangai, A.W., Redinbaugh, M.G., Kinyua, Z.M., Miano, D.W., Leley, P.K., Kasina, M. and Jeffers, D. 2012. First report of maize chlorotic mottle virus and maize lethal necrosis in Kenya. *Journal of Virological Methods* 240: 49–53.