Research Application Summary

# Farmers' perceptions on maize ear rots and the prospects for breeding farmer preferred varieties in Uganda

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**Abstract**

Maize ear rots are a major constraint to maize production globally, and yield loses of up to 70% have been reported in Uganda. Developing varieties resistant to ear rots is a practical strategy that provides better insurance for the small scale farmers. To enhance the adoption of varieties, farmers' perceptions should be included early in the breeding programme. In this study a survey was done in four districts of Uganda to examine farmers' perception on ear rots and their views on agronomic desirable traits. High yield and earliness were the most preferred traits by the farmers.

Key words:  *Fusarium*, grain loss, *Stenocarpella, Zea mays*

**Résumé**

Les putréfactions des épis de maïs constituent une majeure contrainte à la production de maïs au niveau mondial et les baisses de rendement allant jusqu'à 70% ont été enregistrées en Ouganda. Développer des variétés résistantes aux putréfactions d'épis est une stratégie pratique qui fournit une meilleure assurance aux petits agriculteurs. Afin de promouvoir l'adoption des variétés, les perceptions des agriculteurs devraient être insérées le plus tôt possible dans le programme de reproduction. A cet effet, une étude a été menée dans quatre districts de l'Ouganda pour examiner la perception des agriculteurs sur les putréfactions des épis et leurs points de vue sur les aspects agronomiques souhaitables. Le rendement élevé et la précocité étaient les aspects les plus préférés par les fermiers.

Mots clés:  *Fusarium*, perte en grain, *Stenocarpella, Zea mays*

**Background**

Maize *(Zea mays)* is the most important cereal in the tropics and in most of sub-Saharan Africa. The productivity of maize from the farmers' fields is however low averaging 1.2 t/ha compared to  yield  from research which is often in excess of 10 t/ha (Acquino *et al.,* 2001). The low yields have been attributed to both biotic and abiotic stresses. Among the biotic

constraints, diseases rank highly as the major maize production constraint. Maize ear rot is an important disease in most maize growing regions and in Uganda yield losses as high as 70% have been reported (Alakonya *et al*., 2007). A survey done by Bigirwa *et al.* (2007) identified *Stenocarpella* and *Fusarium* as the most predominant ear rot pathogens in Uganda. To improve productivity in disease infected areas, a number of strategies can be adopted which include spraying with fungicide, but this is expensive and in most cases not feasible for small scale farming communities. Developing varieties resistant to ear rots is an alternative strategy that is practical and provides better insurance for the small scale farmers. In order to increase the adoption rates of the released varieties, farmer's perceptions about maize ear rot and preferred traits have to be established and included early in the breeding programme. Thus, participatory approaches have been developed that tap on the extensive knowledge of farmers, investigating the production constraints and the farmers' preferences for the varieties they grow. The objective of this study was to assess farmers' perception on ear rot causes and to investigate the possibilities of breeding new varieties with farmer preferred traits.

**Literature Summary**

Farmers contribution in plant breeding is critical in ensuring that technologies developed are accepted and their adoption increased. Engaging farmers early in the varietal development process helps breeders to understand farmers' needs and preferences which in turn would help the breeder during the variety selection process (Witcombe, 1996). Understanding farmers preferred attributes for a variety could assist in the design of an effective ear rot variety resistance breeding programme that not only incorporates resistance traits to ear rots but improves other agronomic traits as well. According to Soleri *et al.* (2000), acceptability of agricultural technologies of improved varieties by farmers depends on how well farmers' constraints and trait preferences have been identified and incorporated. In Uganda, low yields of major crops still being realized are mostly due to low uptake or adoption of productivity enhancing technologies (Sserunkuuma, 2005).

**Study Description**

The study was conducted in four districts of Uganda; Kapchorwa, Iganga, Kayunga and Masindi in Uganda. These are major maize growing areas of Uganda. Two sub counties were selected per district giving a total of 8 survey sites. At each site, 20 farmers were interviewed during the focus group

discussion. A total of 152 farmers were interviewed, 73 male and 79 female.

Discussion covered issues on ear rots, production constraits, management aspects, varieties and preferred traits. To consolidate the information obtained from farmers and verify issues relating to seed varieties, seed companies were interviewed using a semi structured questionnaire. The companies interviewed were Mount Elgon, Victoria Seed, FICA, NASECO and East African Seed. A questioner was administered to either a breeder or a person directly involved in seed production. Pairwise ranking was used to list items in priority order.

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Farmers were shown diseased maize samples of *Fusarium* and *Stenocarpella* and asked to rate their prevalence. The prevalence for *Stenocarpela* was rated as serious in Iganga and Kayunga, moderate in Kapchorwa and low in Masindi. With *Fusarium* it was rated as low in all the districts except in Kapchorwa where it was rated as serious. Except in Kayunga, farmers attributed too much rains as the most ranked cause for ear rots. Other causes mentioned included Lodging, susceptible varieties, Poor storage, Late planting, Pest damage and Lack of crop rotation.

Farmers across all districts reported having abandoned some susceptible varieties due to ear rot susceptibility. However, they have still cringed to some susceptible varieties such as Longe 5 and 4 as reported in Iganga due to being high yielding and early maturing respectively. Local varieties Munandi, Ndere and Katumani were reported to have been abandoned though they were resistant to ear rots due to associated undesirable traits (Table 1).

A summary of farmer preferred traits or characteristics for selection across the districts analysed by pairwise ranking and scoring showed high yielding followed by earliness as top two farmer preferred traits (Table 2).

**Recommendation**

When selecting candidate ear rot resistant varieties for further evaluation it is essential not to exclusively select resistant ones. Those with partial resistance should also be included in the evaluation process. There is a possibility that absolute resistance varieties could be linked to undesirable traits.

**Table 1. Varieties abandoned to ear rots.**

| Districts | Varieties | Year abandoned | Abandonment reasons |
|---|---|---|---|
| Kayunga, Iganga | Munandi | 1996 | Low yields+late maturing |
| Kayunga, Masindi | Katumani | 1995 | Low yield + small grains |
| Masindi | Ndere | 1970's | Low yields |

**Table 2. Farmers preferred traits across districts.**

| Selection criteria | Rank |
|---|---|
| Yield | 1 |
| Earliness | 2 |
| Palatability | 3 |
| Drought resistance | 4 |
| Marketability | 5 |
| Pest/disease resistant | 6 |
| Big grains | 7 |
| Grain density | 8 |

Based on pairwise ranking and scoring.

## References

Acquino, P., Carrion, F., Calvo, R. and Flores, D. 2001. Selected maize statistics. In: Pingali, P. (Ed.) CIMMYT 1999-2000 World maize facts trends. Meeting world maize needs: Technological opportunities and priorities for the public sector. CIMMYT, Mexico D.F. pp. 45-60.

Alakonya, A.E., Monda, E.O. and Ajanga, S. 2008. Effect of delayed harvesting on maize ear rot in Western Kenya. *American-Eurasian J. Agric. and Environ. Sci.* 4:372-380.

Bigirwa, G., Kaaya, A.N., Sseruwu, G., Adipala, E. and Okanya, S. 2007. Incidence and severity of maize ear rots and factors responsible for their occurrence in Uganda. *Journal of Applied Science* 7:3780-3785.

Sserunkuuma, D. 2005. The adoption and impact of improved maize and land management technologies in Uganda. *Journal of Agricultural and Development Economics* 2:67-84.

Soleri, D., Smith, S.E. and Cleveland, D.A. 2000. Evaluating the potential for farmer and plant breeder collaboration: A case study of farmer maize selection in Oaxaca, Mexico. *Euphytica* 116:41-57.

Witcombe, J.R. 1996. Participatory approaches to plant breeding and selection. *Biotechnology and Development Monitor* 29:2-6.