Farmers in Sub-Saharan Africa cry for tightly closed ear drooping maize phenotypes

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Maize is a very important staple food crop in Sub-Sahara Africa (SSA). The production of maize in SSA has been below optimum. One important constraint to maize production is grain rot/ear rot, which has been reported to cause yield losses ranging between 13 % and 70 %. Of concern is that most of the ear rot-causing fungi like *Fusarium* spp., *Aspergillus* spp. and *Penicillium* spp. produce mycotoxins, which are fungal metabolites that are hazardous to human and animal health. Some of the worst aflatoxin outbreaks have been reported in Kenya between the year 2004 and 2007. Hundreds of people were reported to have died of mycotoxin-related sicknesses. This was considered to be 'one of the worst epidemics' in human history.

Commercial seed producers, particularly the large multinational companies, have been supplying high-yielding maize germplasm to farmers in SSA. Unfortunately, such commercial varieties seem to be susceptible to endemic pests and diseases, especially birds, stemborers and ear rots. For instance, the upright position of the ears and their opening at maturity makes it easy for weaver birds to remove the husks (shucks), allowing secondary pest infestations and entry of rain water, which pre-dispose maize to ear rot fungal infestations. Despite breeding being the main avenue in the development of superior maize germplasms, there seems to be unrealized efforts by commercial seed companies in producing ear rot resistant maize. Farmers planting the commercial cultivars have been faced with the challenge of protecting their apparently high maize yields from losses caused by ear and grain rots. Currently, farmers in SSA have noted these issues, and look at such 'foreign germplasm' with a lot of open reservations. The farmers have been reverting to their traditional seeds, which exhibit closed and drooping ears at maturity. Farmers claim that less ear rot occurs in these traditional cultivars, although they have been

admitting that their yields are quantitatively lower than those from commercial hybrids. This move is unfortunate, because some of the high yielding commercial hybrids could help solve the food security problem, but only if the closed tip traits and the ear dropping traits could have been incorporated during breeding. Regardless of our views as researchers, the farmer remains the 'boss' and therefore evaluates our performance.

As scientists, we are aware that many genes and even loci could be responsible for these novel traits that our 'bosses' require. Since the incorporation of such traits offers a major opportunity in minimizing field and post harvest maize pest and disease infestations, efficient conventional breeding approaches need to be adopted to enhance the high yielding commercial cultivars with closed and ear drooping genes. The challenge is that ear drooping is polygenic, and the success of transferring the phenotype by conventional breeding methods may not be predictable. This calls for maize breeders to employ molecular tools like SSR and ISSR markers in their breeding programs if a solution to this problem is to be developed in the near future.

Photo: Maize ears showing stalk borer damage and ear rot symptoms on a commercial variety in western Kenya (Photo courtesy: Dr. AE. Alakonya)