Wheat (*Triticum aestivum* L.) is an important cereal grain cultivated worldwide. *Fusarium* head blight (FHB) and the associated mycotoxins pose a threat to food security and safety in Kenya, as they cause quantitative and qualitative yield losses, deterioration of grain nutritional value and human and animal health risks. This study assessed the effect of cropping systems and the role of soil and crop residues on the occurrence of FHB and associated mycotoxins in Narok County of Kenya. A field survey covering 51 wheat farms was carried out between June and October 2013. A semi structured questionnaire was used to obtain information on wheat production practices. Top soil, crop residues and wheat spikes were sampled at hard dough stage while kernels were sampled at harvest. The incidence of FHB was determined as the number of blighted heads over the total number of heads within 1m² randomly selected quadrants in each farm, while severity was assessed based on proportion of bleached spikelets. *Fusarium* head blight-causing pathogens were isolated from the soil, crop residues, spikelets and wheat kernels by plating on low strength Potato Dextrose Agar (PDA) and the isolated *Fusarium* spp. were identified using cultural and morphological characteristics. Deoxynivalenol (DON) and T-2 toxin in the wheat kernels were analyzed by competitive Enzyme Linked Immuno-Sorbent Assay (ELISA).

Most (>50%) of the wheat farmers were small scale producers who used farm saved seeds, rotated wheat with maize, grew the two crops side by side, grew wheat in consecutive years, left wheat residues as standing hay for livestock and used simple land preparation methods that did not bury previous crop residues. Prevalence of FHB at hard dough stage was 100% while the mean incidence and severity of the disease ranged from 1 to 100% and 1 to 95%, respectively. *Fusarium* spp. were most prevalent in crop residues; *Aspergillus* spp. and *Penicillium* spp. in soil; and *Epicoccum* spp. and *Alternaria* spp. in wheat ears and kernels. The isolation frequency of the fungal pathogens in crop residues, soil, wheat ears and kernels at harvest significantly (p ≤
0.05) varied among the agro-ecological zones. The most frequently isolated *Fusarium* spp. were *F. chlamydosporum* (2.6%) and *F. graminearum* (2.0%) in crop residues, *F. oxysporum* (3.4%) and *F. proliferatum* (2.5%) in soil; *F. avenaceum* (3.0%) and *F. poae* (1.9%) in wheat ears; and *F. tricinctum* (4.4%) and *F. poae* (2.9%) in wheat kernels. The incidence of the *Fusarium* spp. in crop residues, soil and wheat ears varied significantly (p ≤ 0.05) among the agro-ecological zones but there was no significant (p ≥ 0.05) difference in the incidence of *Fusarium* spp. in wheat kernels at harvest. All the wheat kernels were contaminated with T-2 toxin while 94% were contaminated with deoxynivalenol. The concentration of T2-toxin in the kernels ranged from 8.8 to 35.6 µg/kg (mean = 25.1 µg/kg) while that of DON ranged from 0 to 114 µg/kg (mean = 9.1 µg/kg). The results of this study implied that wheat production practices affect the incidence and severity of FHB and that the disease is caused by a complex of *Fusarium* spp. The *Fusarium* spp. survive in soil and crop residues between cropping seasons thereby providing primary inocula for FHB in a subsequent wheat crop. Although all the wheat kernels were contaminated with T-2 toxin and 94% were contaminated with deoxynivalenol, the toxin levels were within the limits set by the European Commission (EU) and the United States Food and Drug Administration (FDA). This implied that the wheat harvested during the 2013 cropping season in Narok County was safe for human consumption and therefore posed no health risk to humans and livestock. The low incidence of *Fusarium* spp. in spikelets and kernels at harvest could explain the low incidence and severity of FHB in the field and the low levels of DON and T-2 toxin in harvested wheat kernels. It is recommended that inclusion of maize as a rotation crop in wheat production and leaving crop residues on the soil surface after harvesting should be avoided. Additionally, farmers should be encouraged to apply recommended fungicides in the management of FHB; while continuous monitoring and surveillance of DON and T-2 toxin levels in wheat should be promoted. Further studies on the long-term effect of various wheat production practices on FHB are also recommended.

**Key words:** Cropping systems, *Fusarium* head blight, mycotoxin, wheat.