SUMMARY

Corn maize (*Zea maize L*.) is one of the most important grain crops allover the world. It is used mainly for animal feeding, poultry wealth either as green fodder or a main component of dry feed and human consumption in some developing countries. It is also plays an important role in the diet of millions of African people due to its high yields per hectare, its ease of cultivation and adaptability to different agro-ecological zones, versatile food uses and storage characteristics. It plays an important role in the economy in rotation and in animal feed, alcohol fermentation and direct human consumption.

The objectives of the current study were:

(1) Isolation and identification of different storage fungi associated with corn grains.

(2) Studying the activity of these fungi and their ability for production of mycotoxins.

(3) Study the effect of these fungi and their mycotoxins on the chemical composition of corn grain.

(4) Study the effect of *Aquilegia vulgaris L* extract for the inhibition of *Aspergillus* growth and aflatoxins production and

(5) Biological evaluation of effect of *Aquilegia vulgaris L* extract as a protective against aflatoxicosis in laboratory animals.

Corn grain **s**amples (*zea mays*) were collected from five governorates in Egypt (i.e Kafr El-Shikh, Gharbia, Sharkia, Qualubia and Bany Swief) during 2006/2007 season. Isolation and identification of associated fungi was carried out on sterilized and un-sterilized of each samples within different governorates using two tests (i.e. PDA and blotter test). Detection

of mycotoxin production on corn grain samples was carried out using thin layer chromatography (TLC) and the quantity determination of aflatoxins was carried out using high performance liquid chromatography (HPLC). The effect of fungal contamination on the chemical composition of corn grain samples was tested. Moreover, *Aquilegia vulgaris* L extract was tested as antifungal and was biologically evaluated as a protective against aflatoxin in laboratory animals.

The results indicated that 1580 fungal isolates belonging to four fungal genera *Aspergillus*, *Fusarium*, *Penicillium* and *Trichoderma* were isolated. Agar plate (PDA) method was found to be enhanced than blotter test. Moreover, disinfected corn grains were less fungal frequency than non-disinfected grains in both agar plate method and blotter test. The disinfected grains led to higher percentage of germinated seeds in comparison with non-disinfected seeds in either seed testing (agar plate and blotter test). Also the results showed that *Penicillium* spp was the most fungal frequency in all samples followed by *Trichoderma* spp which recorded 37.98 and 36.08% respectively. Whereas, *Aspergillus* genus showed a moderate fungal frequency (25.31%) and *Fusarium oxysporum* showed less fungal frequency (0.63%). Kafr-El-Shikh governorate was found to be the most the higher fungal contaminant than the other governorates followed by Sharkia, Qualubia and Beny Swief which gave the moderate fungal frequency meanwhile; Gharbia was the lesser fungal frequency. The resultes also indicated that Gharbia samples were enhanced which recorded 100% of germination seeds with disinfected and non-disinfected seeds. Determination of mycotoxin revealed that *Aspergillus flavus* isolated from Sharkia governorate samples was able to produce aflatoxin B_1 and B_2 in a concentration of 1.97 and 0.15 µg/g corn grains respectively.

The results also indicated that *Aquilegia vulgaris* L extract succeeded to reduce the growth rate of *Aspergillus flavus* and increased inhibition zone compared with control. Moreover, the growth rate was decreased with increasing the amount of *Aquilegia vulgaris L* extract which reached its maximum when 1.5 ml of the extract was used. The present results also indicated that the chemical compositions of the corn grains were decreased significantly in the fungal infected grains. A significant decrease in lipid, protein, carbohydrates, ash and moisture was found in infected corn grain compared to the non-infected ones.

The protective effects of the ethanol extract of *Aquilegia vulgaris* L against aflatoxin toxicity in rats were further investigated using mature Sprague-Dawley male rats (100-120 g). The results revealed that rats fed aflatoxin-contaminated corn showed severe toxicological, histological and histochemical effects typical to those reported in the scientific literature of aflatoxicosis. Administration of the extract at a dose level of 5 mg/kg body weight succeeded to protect the laboratory animals against aflatoxin toxicity. The animal received the extract alone were comparable to the control which suggested the safety of extract. Meanwhile, the animal received the combined treatment of the extract and aflatoxin showed significant improvement in all biochemical parameters and the histological and histochemical picture of the liver and kidney.

In conclusion, the current study revealed that corn grain samples are highly infected with different fungi; samples collected from Kafer El-Shikh governorate were found to be the higher infected ones. *Aspergillus flavus* isolated from Sharkia governorate had the ability to produce aflatoxins B_1 and B_2. The fungal contaminations of corn grain affect significantly the nutritive values and the quality of the grain as well as with the development

of disease for the consumer. The extract of *Aquilegia vulgaris* L was found to have antifungal effects and protected the laboratory animals from the health hazardous of aflatoxin. Moreover the extract itself was safe and can be used to reduce fungal growth and mycotoxin production as well as a protective against aflatoxin toxicity.