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Antifungal potential of *Hyptis sauveolens* extract against African yam bean seed (*Sphenostilis stenocarpa* (Hoechst ex. A Rich) harms pathogens

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Seeds are known to harbor pathogens which cause yield losses, reduce the nutritional composition and contaminate food. Farmers and agricultural workers are exposed to different species of fungal spores especially aflatoxin-producing strains. *Hyptis sauveolens* is reported to contain essential oil which has antibacterial, antifungal properties and as mosquito repellent. The aim of this study is to ascertain the effect of crude ethanol extract of *H. sauveolens* on mycelia growth inhibition of seed-borne fungi of African yam bean seed. About 80 g of powdered plant material was soaked in 800 ml of absolute ethanol for 4 days and then filtered. The pasty crude extract was dissolved in 50% concentration of dimethyl sulphoxide (DMSO) in the ratio of 1:10 (1g of crude extract dissolved 10 ml of DMSO) to get a concentration of 100 mg/ml which act as the stock. Then serial dilutions were made from the stock to obtain concentrations of 60 mg/ml and 20 mg. About 2 ml of the extract were aseptically dispensed into sterile petri dishes and 18 ml of molten tetracycline-modified Potato Dextrose Agar (PDA) was poured into each petri dishes containing plant extract. About 5 mm of the mycelia disc were placed inside the petri dishes containing the plant extract and (PDA). The petri dishes without plant extract served as control. The experiment was in 3 replications. The result showed that seed-borne fungi associated with African yam bean seed are *Aspergillus niger*, *Aspergillus flavus* and *Fusarium* spp. However, percentage frequency of occurrence of the isolated pathogens showed that *Aspergillus niger* was the most frequently occurred fungi, followed by *A. flavus* while *Fusarium* spp. occurred least. In addition crude ethanol extract of *H. sauveolens* at different concentrations inhibited the mycelia growth of the fungi. The percentage inhibition of the mycelia growth of the fungal isolates by *H. sauveolens* ranged from 33-80.6%, 37-93.6%, 54.6-88.71% for *A. flavus*, *A. niger* and *Fusarium* spp. respectively. *Hyptis sauveolens* leaf extract is effective in controlling the growth of these fungi therefore it could be applied to stored seeds, grains and tubers in form of powder.

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Current challenges and future perspectives of plant and agricultural biotechnology

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While plant agricultural biotechnologies have come to fruition due to the implementation of novel molecular marker-assisted crop breeding and genetic engineering, it is important to distinguish the many considerable achievements from several remaining R&D needs. At the genotype level, the use of genome mapping and omics markers resulted in impressive advances and became routine in breeding of many agricultural plants.At the phenotype level, improved agricultural techniques are continuously being developed resulting in enhanced yields and quality traits. Future directions should be aimed at solving the current major hurdles to agricultural biotechnology: Bridging the genotype-phenotype gap by improving novel high-throughput quantitative and automated selection and screening methods that focus on whole-plant physiology and quality traits. These will enhance the release of newly bred varieties to farmers and avoid long development phases and large-scale field studies; Bridging the genome-environment gap: Many desired plant traits especially stress tolerance depend on the interaction of many genes and metabolic pathways with changing environments and thus enhanced adoption of translational and Interactome research at all R&D stages should be developed; More attention should be given to epigenetic molecular events that are evolutionarily most relevant to plant adaptation to changing environments and to regeneration processes; Improving the biotechnological procedures of novel biomaterial production; Promoting transparent dialog between molecular biologists, plant physiologists, farmers, breeding companiesand the public to solve jointly the economic, sociological, legal and ethical hurdles. We thus urge the adoption of a system-bio-agriculture integrated approach to achieve substantial progress in plant biotechnology and agriculture in the 21st century.

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