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Biomolecular characterization, identification, enzyme activities of molds and physiological changes in sweet potatoes (*Ipomea batatas*) stored under controlled atmospheric conditions

Key words: Controlled atmosphere, Enzyme activity, Molds characterization, Potato spoilage, Sodium hy-pochlorite, Iprodione

Research Summary

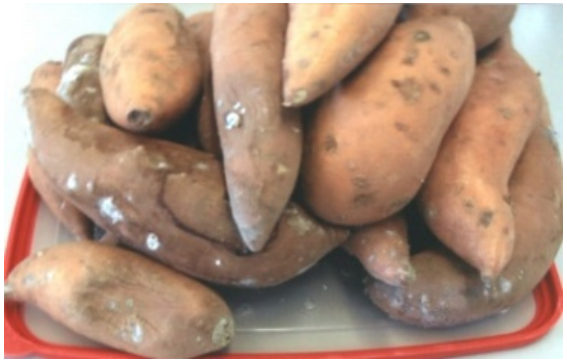
This study focused on sweet potatoes spoilage at different temperatures of 13° C, 21° C and 29° C for 4 weeks. Genomic DNA extraction, polymerase chain reaction, and gene sequencing were employed in the characterization and identification of organisms isolated from the stored samples. Six fungal species were identified from the spoiled sweet potatoes namely; *Penicillium chrysogenum (P. rubens), Penicillium brevicompactum, Mucor circinelloides, Cladosporium cladosporiodes, Penicillium expansum,* and *Penicillium crustosum.*

Innovation points

Penicillium expansum, *P. brevicompactum* and *Rhizopus oryzae* were recovered from the re-infected samples and thus selected according to their level of enzyme activity. The study revealed high levels of activity in cellulase and pectinase; which were notably at their maximum during the initial three days. Polygalacturonase activity was prominent with values ranging from 12.64 to 56.79 µg/mg (*P. expansum*) and 18.36 to 79.01 µg/mg (*P. brevicompactum*).

After the storage period, spoilage was obvious in the control, which had a 100% decay at the end of 3 months experimental compared to samples treated with iprodione and sodium hypochlorite whose decay rates were 5% and 55% respectively. The comparative rate of the progression of decay in the treated samples was expressed as iprodione < sodium hypochlorite < control.

Innovation points



Sample A

Sample B

Sample C (Control)

Fig. 1 | Sweet potato samples after storage under a controlled atmosphere for 3 months at 8°C, 1% O2, 20% CO2, relative humidity 92%, balanced with nitrogen

Conclusions

This study demonstrates that sweet potato tissue damage is due to the activities of divergent microbial enzymes and, in particular, the pectinases of organisms isolated from the infected potato tissues, and suggested utilizing iprodione as curing agent for potato tubers before storage.