

Research Report

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Bio Active Compounds and Antifungal Efficacy of Aqueous Extracts of *Tridax procumbens* Against Brown Rot of Amber Sweet Orange Fruits During Ambient Storage

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Received: 04 Feb., 2026

Accepted: 27 Feb., 2026

Published: 10 Mar., 2026

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Preferred citation for this article:

Oladele O.O., Oyedokun F.D., and Adebomi D.M., 2026, Bio active compounds and antifungal efficacy of aqueous extracts of *Tridax procumbens* against brown rot of amber sweet orange fruits during ambient storage, Medicinal Plant Research, 16(1): 1-10 (doi: [10.5376/mpr.2026.16.0001](https://doi.org/10.5376/mpr.2026.16.0001))

Abstract This research evaluated the bio active compositions and efficacy of *Tridax procumbens* in controlling brown rot of orange fruits, stored at ambient temperature. Orange fruits infected with spore suspensions (6.50×10^4 cfu/ml) of brown rot pathogen (*Lasiodiplodia* sp) were dipped separately into varying concentrations (5, 10, 15 and 100%) of the aqueous extracts where they were assessed daily for disease severity. Each set up was in replicate of five orange fruits while the untreated fruits served as control. All the varying concentrations of the extracts were effective against *Lasiodiplodia*. However, 15 and 100 % extracts proved most effective against the brown rot pathogen, with none of the fruits showing any sign of infection by day 30 in storage when compared with the control fruits that had started showing rottenness since day 10. The number of bioactive compounds detected in the *Tridax* extract was 21. Consequently, the antifungal efficacy of *Tridax procumbens* could be attributed to these biochemical constituents. Hence, *T. procumbens* could be explored as natural, safe substitute in fruit preservation.

Keywords Bioactive compounds; Disease severity; GC- MS; *Lasiodiplodia*; Preservatives

Background

Citrus fruits especially sweet orange is a good source of vitamin C, folic acid and fibres. In fact, sweet oranges are important exportable cash crops that serve as major source of foreign exchange to Nigeria prior to discovery of crude oil in 1951. In fact, it ranks as the most widely planted tree and earns substantial foreign exchange having produced 4.1 million tonnes in the year 2021 (FAOSTAT, 2023). The fruits are either eaten fresh or used for making canned orange juice. In Nigeria, the recommended varieties of sweet orange fruits include Hamlin, Valencia, Amber sweet, Agege Parson Brown, Umudike, Bende, Etir and Meran (Olaniyan et al., 2000). Nevertheless, the major cause of loss of orange fruits after harvest is pathological deteriorations. Thus, the potential foreign exchange earnings through the export of citrus fruits (sweet oranges) are under serious threats due to post-harvest infections, which could result in up to 40% yield loss. In fact, 40 to 50 percent of horticultural crops including fruits and vegetables are lost before they reach consumers while post-harvest losses in tropical fruits vary widely from 10 to 80 percent in both developed and developing countries.

Damage so produced by diseases and pests is probably the major cause of loss in orange fruits. It was reported that *Penicillium* species, especially *P. digitatum* and *P. italicum* with *Geotrichum citriauranti* are the major mould species causing post-harvest decay of sweet oranges (Eckert and Ogawa, 1985; Ohr and Eckert, 1985). However, *Lasiodiplodia* sp IMI50324 was reported as a major post-harvest pathogen of orange fruits in Akure, Nigeria, accounting for over 75 % disease incidence of the total rots in their survey study (Oladele and Aborisade, 2015). The fungus was identified by ITS Rdna sequence analysis using the FASTA algorithm with the fungus data base from European Molecular Biology Laboratory (EMBL) and the sequence showed 100% identity to numerous ITS sequences described from different *Lasiodiplodia* species or their *Botryosphaeria* teleomorphs. Even best matches with the fungus included sequences of *Lasiodiplodia* species reported in peer reviewed literature (Orlandelli et al., 2012).