

Efficacy of Soil-Applied Pineapple Waste Vinegar as a Herbicide in Ghanaian Ratoon Crops: Acidity, Weed Spectrum and Crop Safety

K, w, a, m, e, A, g, y, e, m, a, n, g, ,, K, o, f, i, A, n, k, o, m, a, h, M, e, n, s,
a, h, ,, A, m, a, S, e, r, w, a, a, A, m, p, o, f, o

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| Abstract

Weed management in pineapple ratoon crops is a major constraint for smallholder farmers in Ghana. The expense and limited availability of synthetic herbicides drive the need to investigate affordable, locally sourced alternatives. Pineapple waste vinegar, a by-product of fruit processing, represents a potential organic herbicidal agent. This study evaluated the efficacy of soil-applied pineapple waste vinegar as a pre-emergence herbicide in pineapple ratoon crops. The objectives were to determine its effect on weed seed germination, assess its impact on a spectrum of common weed species in Ghana, and evaluate its safety for the ratoon crop. A field experiment was conducted in the Central Region of Ghana using a randomised complete block design. Pineapple waste vinegar, with a measured acetic acid concentration, was applied to soil at three rates following the harvest of the plant crop. Weed density and species composition were monitored in treated and untreated control plots. Crop phytotoxicity and subsequent ratoon growth parameters were also recorded. Soil application of pineapple waste vinegar significantly reduced total weed germination by up to 78% compared to the untreated control at the highest rate. It was particularly effective against broad-leaved weeds, specifically *Amaranthus spinosus* and *Euphorbia heterophylla*, but showed limited efficacy on grasses such as *Eleusine indica*. No significant phytotoxic effects were observed on emerging

pineapple ratoon suckers at any application rate. Pineapple waste vinegar shows potential as a low-cost, organic pre-emergence herbicide for pineapple ratoon systems. Its efficacy is application-rate dependent and more pronounced on broad-leaved weed species. Further research is recommended to optimise application timing and rates for different soil types. Integration of the vinegar into an integrated weed management strategy, potentially combined with cultural or mechanical methods, should be investigated for broader adoption. organic herbicide, acetic acid, pre-emergence, weed suppression, Ananas comosus, smallholder farming, agricultural waste. This study provides empirical evidence for the herbicidal potential of a locally available agricultural waste product, offering a practical, low-cost weed management option for pineapple farmers in Ghana.
