AFRICAN RURAL DEVELOPMENT STUDIES (INTERDISCIPLINARY -
Vol. 1 | No. 2 | 2022

Longitudinal Assessment of *Aphidius colemani* Parasitoid Efficacy for Aphid Management in Smallholder Cabbage Systems of the Amathole District

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Published: 08 March 2022 **Received:** 17 October 2021

Accepted: 22 January 2022 **DOI:** 10.5281/zenodo.19485909

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ABSTRACT

Background: Smallholder cabbage production in South Africa is severely constrained by aphid infestations, leading to significant yield losses and over-reliance on synthetic pesticides. The potential of the parasitoid wasp Aphidius colemani as a biological control agent within these specific agro-ecological and socio-economic contexts remains poorly quantified.

Purpose and objectives: This longitudinal study aimed to assess the field efficacy and seasonal persistence of inoculative releases of A. colemani for aphid suppression in smallholder cabbage systems, and to evaluate its impact on crop yield and marketable produce.

Keywords: *Biological control, smallholder agriculture, *Aphidius colemani*, integrated pest management, Southern Africa, parasitoid efficacy, on-farm research*

Article Highlights

- 68% reduction in peak aphid densities with parasitoid releases
- 31% increase in marketable yield in treatment plots
- Parasitism rates exceeded 40% for 6-8 weeks post-release
- Longitudinal on-farm study across multiple growing seasons

Methodological Note

Repeated-measures on-farm experiment analysed using generalized linear mixed models with robust standard errors for inference.

This study demonstrates the practical efficacy of biological control in resource-constrained agricultural systems.