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PP-132 [Bee Health]

# Addition of postbiotics enhances the effectiveness of oxalic acid treatments against *Varroa destructor* under field conditions


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## INTRODUCTION

Due to the emergence of varroa mite populations resistant to chemical acaricides and the residues generated in beehives, as well as the highly variable effects of organic treatments such as oxalic acid, it is necessary to find new products that are effective or that increase the effectiveness of existing products against *Varroa destructor*, such as postbiotic products, which have been shown to be effective against this mite in *in vitro* experiments. The aim of this study was to evaluate the efficacy of postbiotics from beehives, and their combinations with oxalic against *V. destructor*.

## MATERIALS AND METHODS

To test the possible synergies between oxalic acid and postbiotics against Varroa, four groups were established: **Control (C)**, **Postbiotic (POS)**, **Oxalic Acid (OX),** and a **combination of both (POX).**
It was applied to the hive using cellulose strips together with glycerine and the corresponding compound, and eight strips were placed per hive in the breeding area.

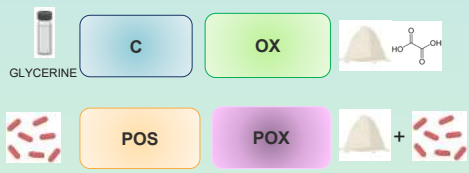


*Image 1. Treatment with cellulose strips in a beehive.*

To determine the effect of each treatment, the following parameters were monitored:

PHORETIC VARROA MITES PRE AND POST TREATMENT

BREEDING VARROA MITES PRE AND POST TREATMENT

VARROA MITE FALL

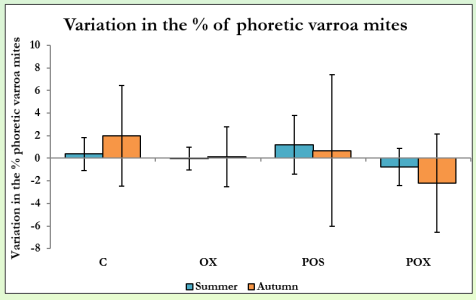
PRODUCT EFFICACY

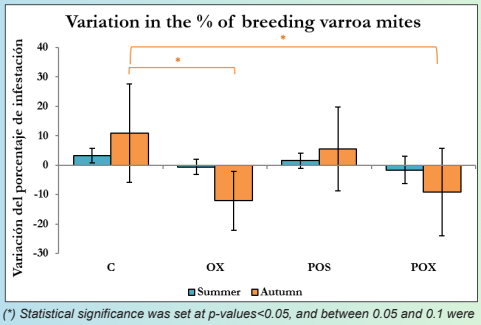
$$Efficacy(\%) = \frac{Fall\ of\ mites\ during\ treatment(FMT)}{FMT + Mite\ remaining\ after\ treatment}$$

*Mite remaining after treatment=*
*(Nº bees× Phorectic mites) + (Nº brood cells×Breeding mites)*

## RESULTS

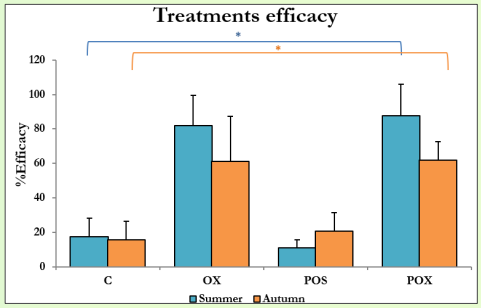
- There was not statistically significant differences between treatments groups in the variation in the percetage of **phoretic varroa mites**.




*(*) Statistical significance was set at p-values<0.05, and between 0.05 and 0.1 were considered marginally significant.*

- **Varroa levels in brood** increased significantly in the control group and decreased in the OX and POX groups in summer, and the same results were repeated in autumn, with a statistically significant reduction ((C-OX) (*p-value*=0.037); (C-POX) *p-value*=0.083)




*(*) Statistical significance was set at p-values<0.05, and between 0.05 and 0.1 were considered marginally significant.*

- Regarding the **efficacy**, in summer POX (87.59%) showed a marginally significant difference regarding C (17.54%) (*p*-value = 0.084). In autumn the POX treatment showed a significantly higher efficacy than C (*p*-value = 0.007) and POS (*p*-value = 0.002)
- The efficacy of the treatments was generally higher in the summer experiment (82% OX, 87.6% POX) than in the autumn experiment (61.1% OX, 61.8% POX).

## CONCLUSIONS

**Postbiotics** derived from the isolation of lactic acid bacteria from the normal microbiota of bees can be a very useful tool in the fight against *V. destructor*, demonstrating an **increase in the effectiveness of oxalic acid treatments**.
Further studies will be conducted to test new methods of applying postbiotics in hives and the effect of **combining them** with other organic treatments.


Cofinanciado por el Fondo Europeo Agrícola de Desarrollo Rural (FEADER) en un 80% dentro del Programa de Desarrollo Rural (PDR) de Extremadura 2014-2022, por la Junta de Extremadura en un 16,28%, y por el Estado, Ministerio de Agricultura, Pesca y Alimentación (MAPA), en un 3,72%.

## PP-132 [Bee Health]
## Addition of postbiotics enhances the effectiveness of oxalic acid treatments against Varroa destructor under field conditions

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Varroa destructor poses one of the greatest risks to the beekeeping sector. Currently, efforts are underway to design alternative strategies for controlling this parasite. One example of an alternative treatment is postbiotics that are liquid extracted from inactivated acid-lactic bacteria derived from health bees. Postbiotics have shown high efficacy in vitro against V. destructor. The objective of this study is to evaluate the effectiveness of applying postbiotic compounds, both alone and in combination with oxalic acid, under field conditions. Two experiments were conducted, one in summer and the other in autumn, where the hives were divided into four groups according to the treatment received: control (C), postbiotic (POS), oxalic acid (OX), and the combination of both (POX). For product application, cellulose strips impregnated with each product were made, and eight strips were placed in each hive. All hives were monitored at the beginning and end of the experiment, estimating the number of bees and the amount of capped brood, and bee and brood samples were taken to determine the levels of phoretic varroa and varroa in brood, respectively. Additionally, strips were placed on the bottom boards, and mite fall was measured every two days. To calculate the effectiveness of each treatment, mite fall data were used, and the number of remaining mites in the hives was estimated based on the bee, brood, phoretic varroa, and varroa in brood data. Results showed that the combined compound (POX) was the most effective in reducing phoretic varroa levels in both experiments. Treatment efficacy was very low in the C and POS groups, and significantly higher in the OX and POX groups. Thus, the postbiotic alone did not show a clear effect against V. destructor under field conditions, but it significantly improved the results of oxalic acid when applied in combination, suggesting it could be a useful adjuvant to enhance the effect of this compound.