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### ► To cite this version:

S. Wang, T. Charbouillot, Pascale Goupil, M. Saudreau, C. Richard. Effect of solar light on the elicitor acybenzolar-S-methyl, during the use phase of its life cycle. *Biocontrol* 2014, Sep 2014, Perpignan, France. 1 p. hal-01268821

**HAL Id: hal-01268821**

**<https://hal.science/hal-01268821>**

Submitted on 2 Jun 2020

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Effect of solar light on the elicitor acybenzolar-S-methyl, during the use phase of its life cycle  
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The canopy architecture governs the lifetime of the active ingredient of phytosanitary products and the formation of degradates on the leaves. In the worst case, the early dissipation makes necessary the repetition of applications and thus leads to a chemical crop input increase. Our work aims to analyse the links between the canopy architecture, the microclimate and the active ingredient photodegradation focusing on the biological effects on plants through the study of induced natural defense systems (SDN). The work divided in three steps aims to (i) determine the photodegradability of selected active ingredients upon irradiation with solar light, (ii) study the quantitative activity of induced SDN via a molecular physiology approach and (iii) place these chemical and biological processes in a spatial and temporal variable microclimate relevant to that of the canopy. All these data at the different scales (cell, leaf, tree) will be further integrated in a large model giving a numerical description of the fate of active ingredients in the canopy.

The present work focuses on the first step of the project. The chosen active ingredient is Acybenzolar-S-Methyl. This analog of salicylic acid has no direct effect on the pathogen but exerts a stimulation on the plant defense system. It is marketed in France as Bion. Acybenzolar-S-Methyl absorbs solar light intensively until 350 nm; therefore it can potentially undergo photolysis. In a first step, we measured the photodegradability of Acybenzolar-S-Methyl when it is deposited on wax films that mimics the epicuticular layer of leaves and exposed to simulated solar light. Under these conditions, its half-life is only one hour. In a good agreement, the photolysis quantum yields in organic solution are comprised between 0.067 and 0.092, confirming the good efficiency of the photolytic process. Several photoproducts were detected. The elicitor activity of the active ingredient and photoproducts as well is under investigation on cell culture system.