Plant defence inducer properties of the grape marc extract
Razik Benouaret, Eric Goujon, Pascale Goupil

To cite this version:
Razik Benouaret, Eric Goujon, Pascale Goupil. Plant defence inducer properties of the grape marc extract. IOBC-WPRS Bulletin, 2013, 89, pp.95-97. <hal-00981229>

HAL Id: hal-00981229
https://hal-clermont-univ.archives-ouvertes.fr/hal-00981229
Submitted on 21 Apr 2014

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L’archive ouverte pluridisciplinaire HAL, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d’enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.
Plant defence inducer properties of the grape marc extract

Razik Benouaret, Eric Goujon, Pascale Goupil

Clermont Université, Université Blaise Pascal, UMR 547 PIAF-UBP/INRA- Campus universitaire des Cézeaux, 24, avenue des Landais, BP 10448, 63000 Aubière cedex, France.
e-mail address: Pascale.GOUPIL@univ-bpclermont.fr

Abstract: Plant defence inducers (PDIs) constitute a class of bioactive compounds with an emerging potential to be integrated in plant protection strategies. Plant extracts such as grape marc extract (GME) could elicit plant defence responses in different species. Foliar infiltration of GME to tomato and Arabidopsis leaves resulted in the appearance of macroscopic symptoms and autofluorescent compounds.

Key words: grape marc, plant defence reactions, integrated control

Introduction

Induced resistance is becoming a widely accepted “green” approach within integrated disease control strategies. Many different substances could elicit plant defence, and there is an increasing demand to search and identify new ones. The polyphenolic rich extract from grapes might offer a new class of phytosanitary bioproduct having not only the PDI activity (Goupil et al., 2012) but also the ability to reduce pesticide photodegradation (Eyrheraguibel et al., 2010). Our previous work provided molecular evidence of GME-PDI activity by monitoring local and systemic upregulation of PR genes (PR1 and PR2) and localised HR-like lesions on tobacco-treated leaves. Therefore it is of crucial importance to determine the potential activity of this botanical extract on a broad range of plants. Herein we show that tomato and Arabidopsis responded to this GME as tobacco plants suggesting its potential use as elicitor.

Material and methods

Leaves infiltration GME is a Vitis vinifera L. hydroalcoholic extract provided by Grap’Sud as described in Goupil et al. (2012). The botanical extract (pH4.3) was applied as an aqueous solution to foliar tissue by infiltration with a plastic seringue. As a negative control, leaves were infiltrated with acidic ultrapure water (pH4.3). Distinct leaf areas were infiltrated (50µl) and examined under bright or UV (at 312 nm) light.

Results and discussion Foliar infiltration of GME to tomato and Arabidopsis plants resulted in the appearance of localised HR-like lesions (brown zones). Figure 1 shows the leaf abaxial face of both plant model infiltrated with 0.25% GME. A brown desiccated area appeared within the infiltrated tissue at four days post-infiltration (dpi). Examination of the leaf tissue under UV light revealed that both the infiltrated area and the surrounding zone displayed fluorescence in both species (Figure 1d,l,n,p), suggesting an accumulation of phenolic compound. The rest of the leaf remained unaffected. Recently, the elicitor activity of
GME was shown on tobacco leaves (Goupil et al., 2012). GME induced lesions with biochemical changes, such as cell death, local and systemic molecular responses (Goupil et al., 2012). The macroscopic changes induced by GME on tomato and Arabidopsis leaves might be the result of similar plant defence reactions.

In Arabidopsis, the macroscopic changes induced by GME were also analysed at the whole plant level. At the flowering stage, five rosette leaves were infiltrated with GME and macroscopic symptoms were examined on young and mature leaves. Figure 1f-p shows the necrotic symptoms induced by 0.25% GME at 4 dpi. Younger leaves (Figure 1g,i) displayed faint chlorotic infiltration areas while older leaves (Figure 1n,p) spread out large and strong lesions. Intermediate symptoms were observed on middle-aged leaves (Figure 1k). Fluorescence intensity indicative of phenolics production within infiltration areas was correlated with increasing severity of necrotic lesions (Figure 1h,j,l,n,p). The enhanced capability of a mature leaf to initiate plant defence reactions was demonstrated previously on tobacco. In accordance, Arabidopsis older leaves (Figure 1p) displayed almost full fluorescent limb. However, young growing leaves were less reactive to GME elicitor molecules than...
mature ones (Goupil et al., 2012). The data illustrates the importance of plant phenology in defense reaction achievement. Conceivably, expanding tissues having immediate needs of nutrients and energy for primary metabolism, could not achieve optimum processes for both defence reactions and growth (Bolton, 2009) or have not as yet fully developed their defence response.

**Acknowledgements** We thank Céline Sac for her help in growing tobacco plants and Dominique Marcon for the tobacco leaf images.

**References**

