THERMAL TOOL FOR EVALUATION OF ESSENTIAL OILS OF *EUCALYPTUS SPP* SUSCEPTIBLE AND RESISTANT TO *GLYCASPIS BRIMBLECOMBEI* ATTACK

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Abstract

Eucalyptus spp genus is economically important to different industry fields. There are pests that damage the development of eucalypts and *Glycaspis brimblecombei*, a sap-sucking insect, is one of them. Studies about this insect attack to the eucalypts showed preferences. This work aim was to compare the preferences of the insect with thermoanalytical characteristics of different eucalypts (susceptible, less susceptible and resistant to *Glycaspis brimblecombei*) essential oils. The leaves of six species of *Eucalyptus* were crushed and the essential oil was extracted using Clevenger apparatus. The Shimadzu DTG-60H was used to analyze the samples. The results showed that the samples from more susceptible eucalypts had total mass loss at about 124ºC to 156ºC, lower than samples from more resistant eucalypts (from 168ºC to 175ºC). Furthermore, the study suggests that the susceptibility or the resistance of eucalypts to the pest may be related to their essential oil composition and concentration of monoterpenes and sesquiterpenes.

Keywords: Essential oil, *Eucalyptus spp, Glycaspis brimblecombei,* Thermal analysis.

1. INTRODUCTION

Eucalyptus spp. wood is largely used for pulping and production of timber, having a great economic importance (HUNG et al., 2015). The essential oil is insecticidal, antibacterial and antifungal (CHENG et al., 2009; BATISH et al., 2008). *Glycaspis brimblecombei* Moore (Hemiptera: Aphalaridae) is a sap-sucking insect that was first found in Brazil (SP) in 2003, Figure 1A. The damages in the eucalypts caused by *G. brimblecombei* are leaf curl and leaf discoloration, including the increase of susceptibility to sooty molds, leading to growth decrease or even causing plant's death, Figure 1B (SANTANA; BURCKHARDT, 2007). Pereira et al. (2013) reported the *G. brimblecombei* preferences for different species of *Eucalyptus* spp. The essential oils are an important way of plants protection against insects and fungi attacks (BATISH et al., 2008). The pesticide activity of eucalypts essential oils is due to the synergism between their compounds (CIMANGA et al., 2015). Nevertheless, the resistance of the eucalypts to the attack of insects may be related to the plant secondary metabolites (PEREIRA et al., 2013).

Thermal analyzes are techniques that evaluate the behavior of a sample under heating or cooling, allowing the characterization of essential oil samples. The Thermogravimetry Analysis (TGA) shows information about the thermal behavior, stability and purity of essential oils, presenting the mass loss in function of time or temperature. On the other hand, the Differential Thermal Analysis (DTA) shows the event behavior (HAZRA et al., 2004; IONASHIRO; CAIRES; GOMES, 2014).

Figure 1 – (A) *Glycaspis brimblecombei* adult. (B) Resistant (left) and susceptible (right) eucalyptus to *Glycaspis brimblecombei.*

2. OBJECTIVE

The aim was to compare the thermoanalytical characteristics of different eucalypts essential oils with preferences of the *Glycaspis brimblecombei* attack.

3. MATERIALS AND METHODS

This information about the susceptible and resistant clones to *G. brimblecombei* was based on Camargo et al, 2014. The leaves were collected in May/2014 in Vazante-MG (17°33'S, 45°37'O) and were crushed using a blender. The samples were classified according to the psyllid attack: 1-2 – susceptible; 3-5 – less susceptible; 6 – resistant. The essential oils were extracted by hydrodestilation using clevenger apparatus. The DTG-60H (Shimadzu, Japan) was used for TG-DTA analysis. The samples were heated from 30 ºC to 300 ºC using open aluminum crucibles with 5 µL (4,2270 ± 0,4595 mg) of the sample under a nitrogen flow of 50 $mL.min^{-1}$ and heating rate of 10 ºC min^{-1}. Alpha alumina was added to the sample to prevent essential oil from boiling. TA-60 WS was used for data analysis.

4. RESULTS AND DISCUSSION

In TGA curves, Figure 2A, the samples 1, 2 and 3 showed total mass loss at about 124ºC to 156ºC, lower than samples 4, 5 and 6 (from 168ºC to 175ºC). Samples 4, 5 and 6 showed a second event in DTA curve, Figure 2B, which initiated between 120ºC and 132ºC and ended between 165ºC and 184ºC. The samples 1, 2 and 3 showed the end of the only event in DTA curve in lower temperatures (from 141ºC to 156ºC). Therefore, the resistance of *Eucalyptus* to *G. brimblecombei* may be related to the composition of the essential oils. Eucalypts essential oil is mainly composed by monoterpenes and sesquiterpenes (CHENG et al., 2009). Monoterpenes have lower boiling points than sesquiterpenes. Furthermore, the sample 1 showed similar result compared to cineole from eucalypts essential oil (HAZRA et al., 2004). Consequently, the samples that had mass loss in a lower temperature may show higher concentration of monoterpenes than sesquiterpenes (MASTELIC, 2001).

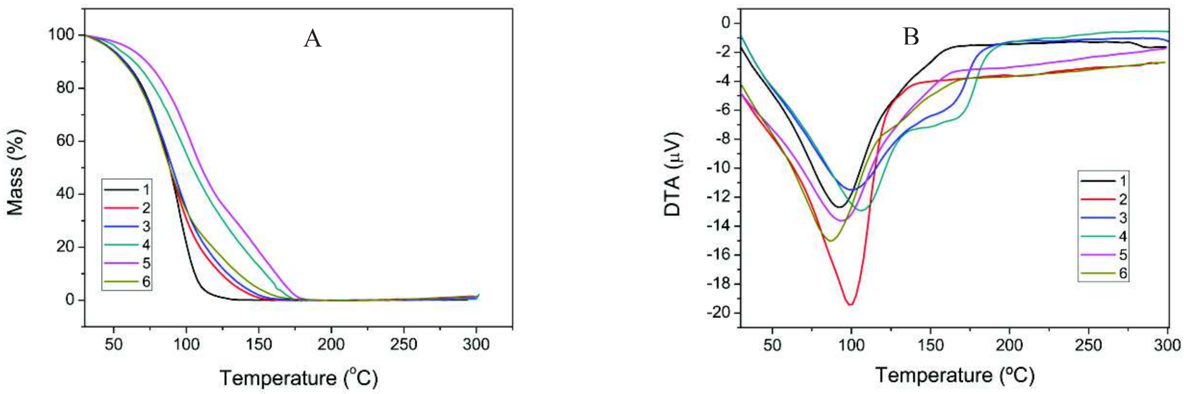

Figure 2 – The TGA curves (A) and DTA curves (B) of the eucalypts essential oil classified by *Glycaspis brimblecombei* preference being: 1-2 – susceptible; 3-5 – less susceptible; 6 – resistant.

5. CONCLUSION

The *Glycaspis brimblecombei* preferences for eucalypts can be associated with essential oil composition. The thermal analyses allowed the comparison and the samples from more susceptible eucalypts had total mass loss at about 124ºC to 156ºC, lower than samples from more resistant eucalypts (from 168ºC to 175ºC). These results can be correlated with essential oil composition and monoterpenes and sesquiterpenes concentrations. Further studies using GC-MS for compounds identification will be developed.

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