

## ***Interactive comment on “A mechanism for biogenic production and emission of MEK from MVK decoupled from isoprene biosynthesis” by Luca Cappellin et al.***

**Anonymous Referee #2**

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Generally, I think that the study offers new knowledge in the area of transformation pathways of carbonyl compounds to 2-butanol and 3-buten-2-ol. The results are valuable and will inspire researchers to test the new hypothesis. For example, in this study with red oak, the authors did find a link between isoprene and methylvinylketone. Yet, I wonder, whether the link could be characteristic to some other plant species? In similar as in 2012 Jardine et al published a correlation between the emissions of isoprene and methacrolein, but in the present study, that correlation was missing. By the way, although testing of methacrolein did not give expected results, I still recommend adding its molecular structure to Figure 5. I find that the study is done by using suitable analytical methods and the conclusions are all appropriate. MS is well written and there

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are no serious flaws. According to the initial MS evaluation, the authors have improved the figures. The MS is well structured and the abstract provides a complete summary of the results.

Minor criticism In the Abstract the abbreviation of MVK is not explained

In the Abstract L 7, please change '... we show that MVK and MEK emission caused by heat stress is...' to '... we show that MVK and MEK emissions caused by heat stress are...'

Among Keywords and later in the text (P 3 L9 and 22) please change '2-butenol' to '2-butanol'

At the beginning of the Introduction P1, I would change 'has' to 'have' in '...and particularly the latest studies employing genetic engineering to produce transgenic plants with modified isoprene emission, has ...' P 2 L3 change 'there is plenty of evidence that isoprene positively influence..' to 'there is plenty of evidence that isoprene positively influences..'

At the beginning of Results L4 ' MVK reduction generated either MEK or 3-buten-2-ol,' - according to Figure 2 I would say 2-butanol instead of 3-buten-2-ol

At the beginning of P4 starting from L2 'Emission of MVK+MACR+ISOPPOOH was detected at a level of  $0.001 \pm 0.002$  nmol m<sup>-2</sup>s<sup>-1</sup>' - by comparing the text to the figure it seems that the number should be multiplied with 1000, no? The same mistake is repeated in the following sentences.

Abbreviation of methylvinylketone, methylethylketone and ROS should be explained again at the beginning of the Discussion

P5 L 7 to 9 I would use the plural instead of singular 'Emission of MVK and MEK has been rarely measured at leaf level and is challenging to measure because i) emission is small, especially in the case of MVK; ii) separation of leaf and atmospheric sources in the presence of high isoprene emissions is difficult. Jardine and co-workers (Jardine

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et al., 2012, 2013) reported emission of methacrolein (MACR) and methyl vinyl ketone (MVK) in isoprene emitting trees. ' to 'Emissions of MVK and MEK have been rarely measured at leaf level and are challenging to measure because i) emissions are small, especially in the case of MVK; ii) separation of leaf and atmospheric sources in the presence of high isoprene emissions is difficult. Jardine and co-workers (Jardine et al., 2012, 2013) reported the emissions of methacrolein (MACR) and methyl vinyl ketone (MVK) in isoprene emitting trees. '

P9 L9 I would change '...repeated switching..' to 'repeated by switching ...'

Figure 1 - please add titles to y-axes, change the unit to 'nmol m-2 s-1' and it is sufficient to write 'Time (min)' only under panel e

Also, I would change 'Uptake and transformation of MVK (a) and MACR (e) and of MVK transformation products, MEK (b), 2-butanol (c), 3-buten-e-ol (d) by red oak leaves. Negative values denote uptake, while positive values indicate emission. ' as follows 'Uptake of MVK (a), MEK (b), 2-butanol (c), 3-buten-e-ol (d) and MACR (e) and emission of their oxidized or reduced products in red oak leaves. Negative values denote the uptake - and positive values the emission of volatiles. '

Please check also the rest of the figure legends.

Figure 2 – Is it possible to show or mark in the text the proportion of methacrolein (MACR) in the mixture of MVK+MACR+ISOPOOH? Does the figure show mean  $\pm$  SE or mean  $\pm$  SD? I would delete negative error bars. Please use 'min' instead of 'minutes'.

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