




Reducing plant water stress with soil conditioners and foliar protectors for rain-fed avocado production under subtropical conditions

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Introduction & Objectives

- Commercial production of rain-fed avocados under subtropical conditions in Brazil exposes the trees to severe water stress conditions during the induction, flowering and fruit set periods.
- This situation may partially explain low national avocado yields.
- Therefore, two trials were installed to validate the effects of different mulch and amendments applied to the soil surface, and of canopy sprayings of mineral oil, glycerol and kaolin-based foliar protectors for reducing water stress, and also to quantify their effects over fruit yield and quality in commercial avocado orchards in São Paulo State.





Materials and Methods


- Two trials were conducted on adult non-irrigated commercial orchards of 'Hass' (6 year-old) and 'Breda' (10 year-old) avocados in São Paulo State.
- Water status:** leaf water potential was measured under stressed (drought) and non-stressed conditions (after rain), using a pressure chamber (PMS, New Jersey, USA) on sunlit leaves collected from the middle section of non fruiting and non-flushing shoots from the last vegetative cycle.
- Leaf a and b chlorophyll index** was measured with a chlorophyll meter (CloroflOG[®] 1030, FALKER Inc).



Measuring the a+b chlorophyll index with a chlorophyll meter




Measuring leaf water potential with a pressure chamber



Results

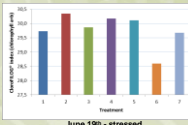
SOIL MULCHES ON 'HASS' AVOCADO

July 26th - unstressed



Treatment	Leaf Water Potential (MPa)
T1: control	~0.02
T2: mulch	~0.01
T3: wood chips	~0.03
T4: gypsum + lime	~0.02
T5: T2+T4	~0.02
T6: T3+T4	~0.02
T7: bare soil	~0.01

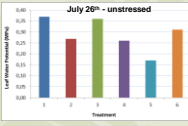
June 19th - stressed



Treatment	Chlorophyll Index (a+b)
T1: control	~245
T2: mulch	~255
T3: wood chips	~250
T4: gypsum + lime	~255
T5: T2+T4	~255
T6: T3+T4	~255
T7: bare soil	~240

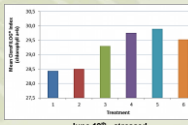
FOLIAR PROTECTORS ON 'BREDÁ' AVOCADO

July 25th - unstressed



Treatment	Leaf Water Potential (MPa)
T1: control	~0.02
T2: 1% glycerol spraying	~0.01
T3: 1% mineral oil spraying	~0.03
T4: Kaolin #1	~0.02
T5: Kaolin #2	~0.02
T6: Kaolin #3	~0.02

June 19th - stressed



Treatment	Chlorophyll Index (a+b)
T1: control	~245
T2: 1% glycerol spraying	~255
T3: 1% mineral oil spraying	~250
T4: Kaolin #1	~255
T5: Kaolin #2	~255
T6: Kaolin #3	~255

Conclusions

- For 'Hass' avocado under non-stressing conditions, covering the soil with mulch or mixtures of gypsum+lime and mulch or avocado wood chips, improves plant water status.
- For 'Hass' avocado under stress conditions, mulching improves chlorophyll content, compared with covering the soil with avocado wood chips and gypsum+lime.
- For 'Breda' avocado under non-stressing conditions, canopy spraying with kaolin #2 improves leaf water status as compared with the untreated trees.
- For 'Breda' avocado under stress conditions, canopy spraying with 1% mineral oil, or with any of the 3 kinds of kaolin films, improves the chlorophyll content.



'HASS'



'BREDA'

IHC 2014

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IHC 2014

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Acknowledgments

The authors acknowledge Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP) for the financial support to this research (Proc. 2012/13527-4)

