

Comparison of different drying techniques in Madagascar

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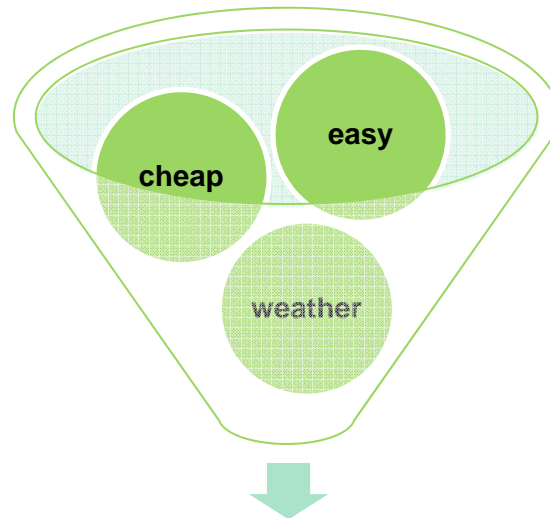
Slide 1

SIX1

Xavier Simonnet, 04/10/10

Aims

Evaluate the incidence of various drying techniques usually used in Madagascar, as well as some other variants, on the artemisinin content.



State of knowledge

Ferreira <i>et al.</i> , 1992	Effect of drying methods on the recovery and yield of artemisinin from <i>Artemisia annua</i> L.	Hort Science, 27 (6), 650.
Charles <i>et al.</i> , 1993	Effect of water stress and post-harvest handling on artemisinin content in the leaves of <i>Artemisia annua</i> L.	J. Janick and J.E. Simon (eds.), New crops. Wiley, New York
Simonnet <i>et al.</i> , 2001	Field drying of <i>Artemisia annua</i> L.: increasing artemisinin content and lowering production costs.	RSVAH, 33 (5) 263-268.
Laughlin, 2002	Post-harvest drying treatment effects on antimalarial constituents of <i>Artemisia annua</i> L.	Acta Horticulturae, 576 , 315-320.
Simonnet <i>et al.</i> , 2008	<i>Artemisia annua</i> L., harvest and post-harvest treatments (2007-2008)	MMV report
Gu AnYu <i>et al.</i> , 2008	Study on the optimal harvest time and drying methods of <i>Artemisia annua</i> L. in Yunnan province.	Southwest China Journal of Agricultural Sciences, 21 (56), 1682-1684.
Feng ShiXin <i>et al.</i> , 2009	Study on the machining method of the artemisinin content of <i>Artemisia annua</i> .	Guangxi Zhiwu/Guihaia, 29 (6), 857-859
Simonnet <i>et al.</i> , 2010	<i>Artemisia annua</i> L., harvest and post-harvest treatments (2008-2009)	MMV report
Ferreira <i>et al.</i> , 2010	Drying affects artemisinin, dihydroartemisinic acid, artemisinic acid, and the antioxidant capacity of <i>Artemisia annua</i> L. leaves.	J. Agric. Food Chem., 58 , 1691-1698

Drying techniques tested

- Drying on mat : 1, 2, 4 or 6 layers /entire plants



■ Drying of stem chunks on mat



■ **Drying on trestles: layers more or less thick**



■ Drying on wires



2 periods of harvest

Drying processes	100% open air	March 2009 ⁽¹⁾	July 2009 ⁽²⁾
on mat 1 layer	No	✓	✓
on mat 1 layer	Yes	✓	✓
on mat 2 layers	Yes	✓	
on mat 4 layers	Yes	✓	✓
on mat 6 layers	Yes		✓
stem chunks on mat	No		✓
stem chunks on mat	Yes		✓
on trestles, layer rather tamped	Yes	✓	✓
on trestles, layer not tamped	Yes	✓	✓
on wire	Yes	✓	

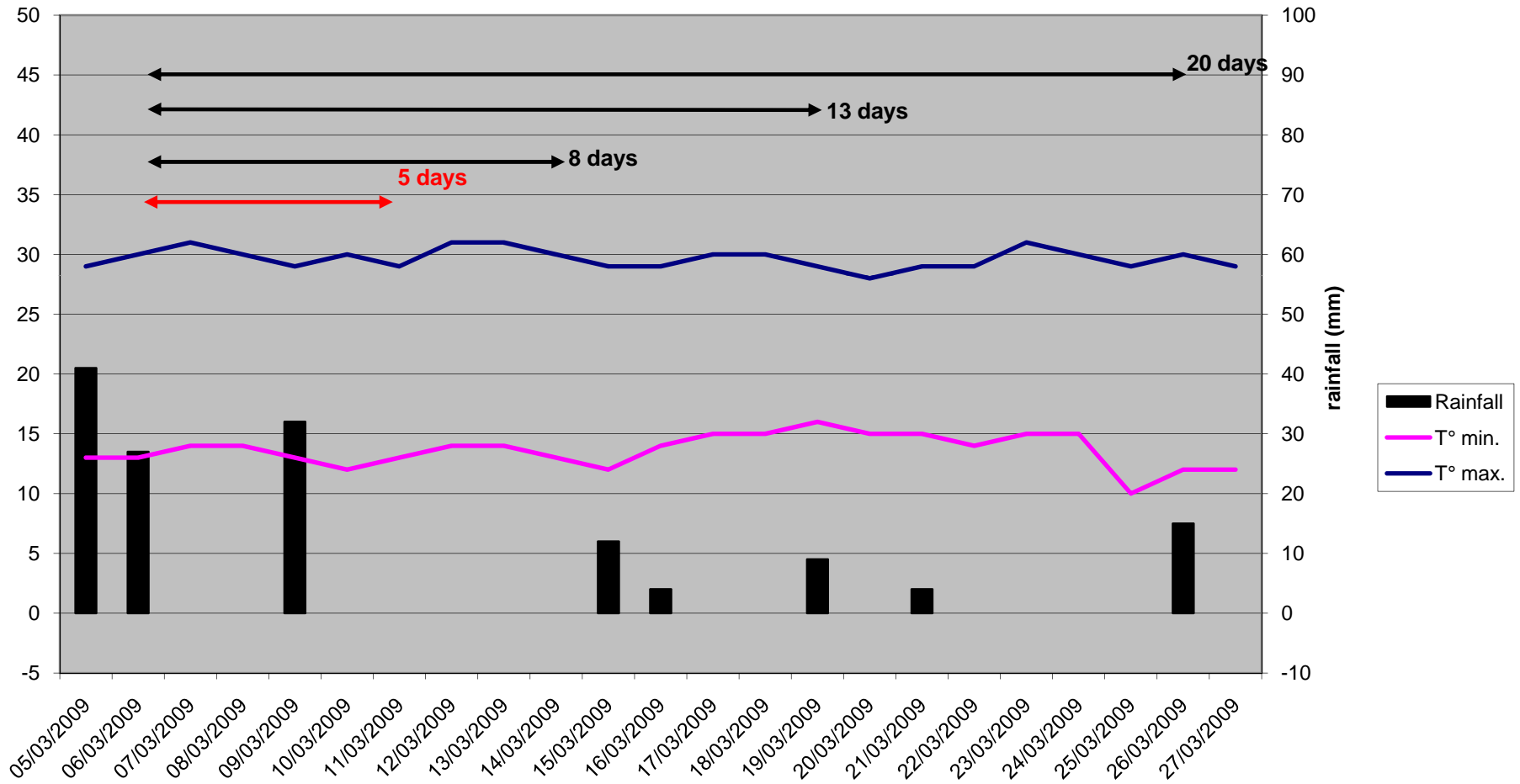
⁽¹⁾ Local variety planted 11 September 2008 (LRS)

⁽²⁾ Artemis variety planted 3 January 2009 (SRS)

Drying in March 2009

Médiplant

temperature (°C)

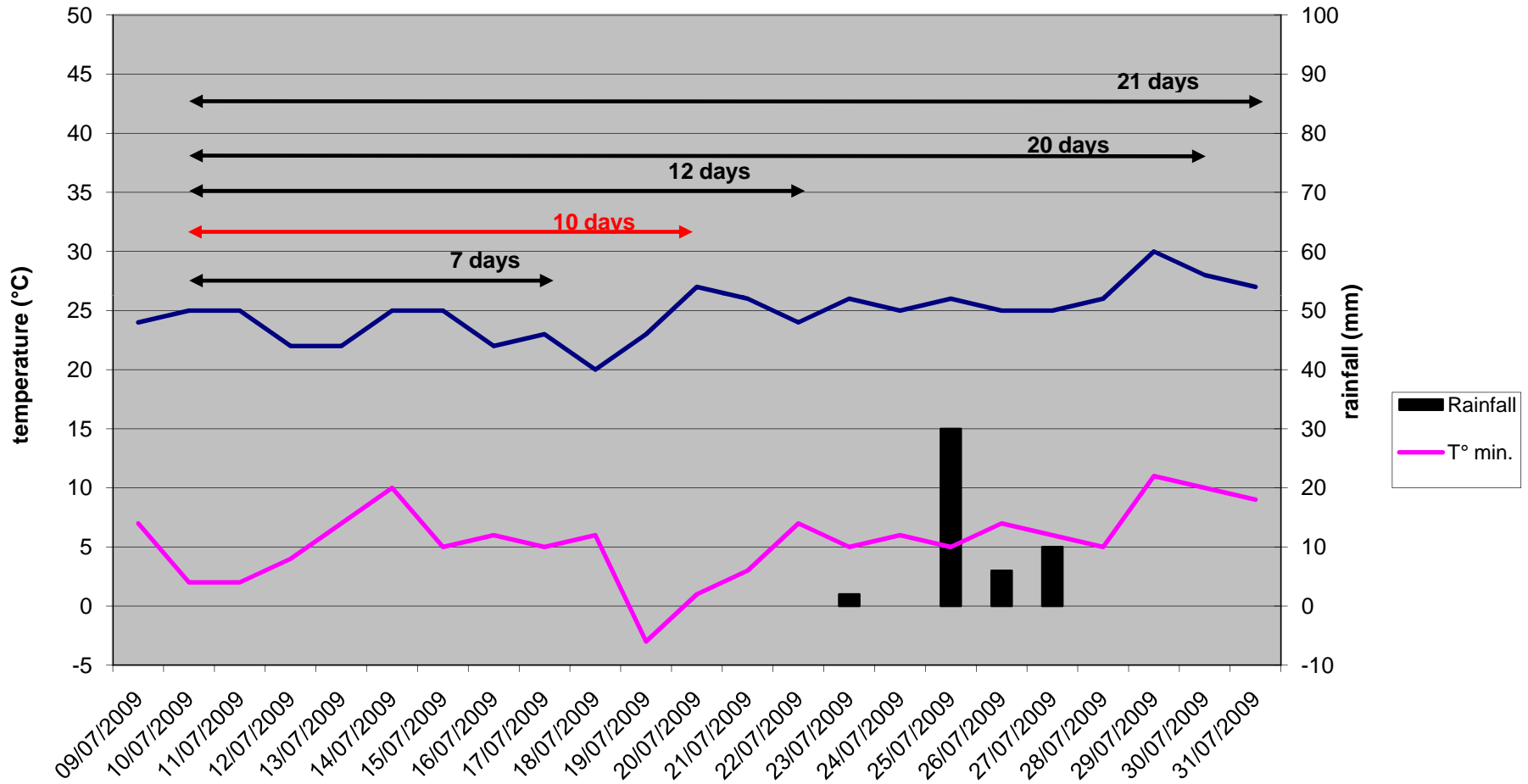


Artemisinin Conference/12th-14th October 2010, Madagascar

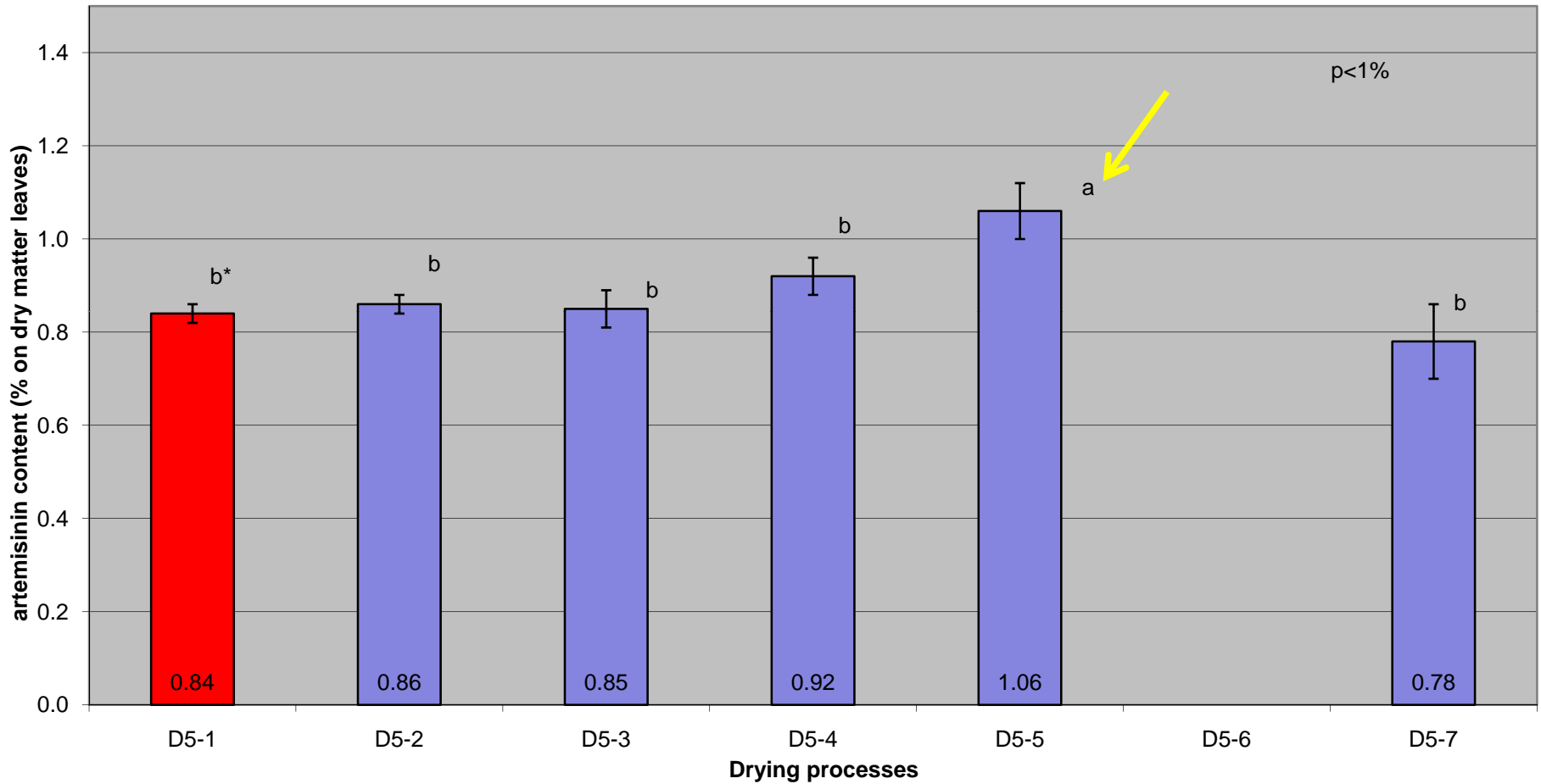
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Drying in July 2009

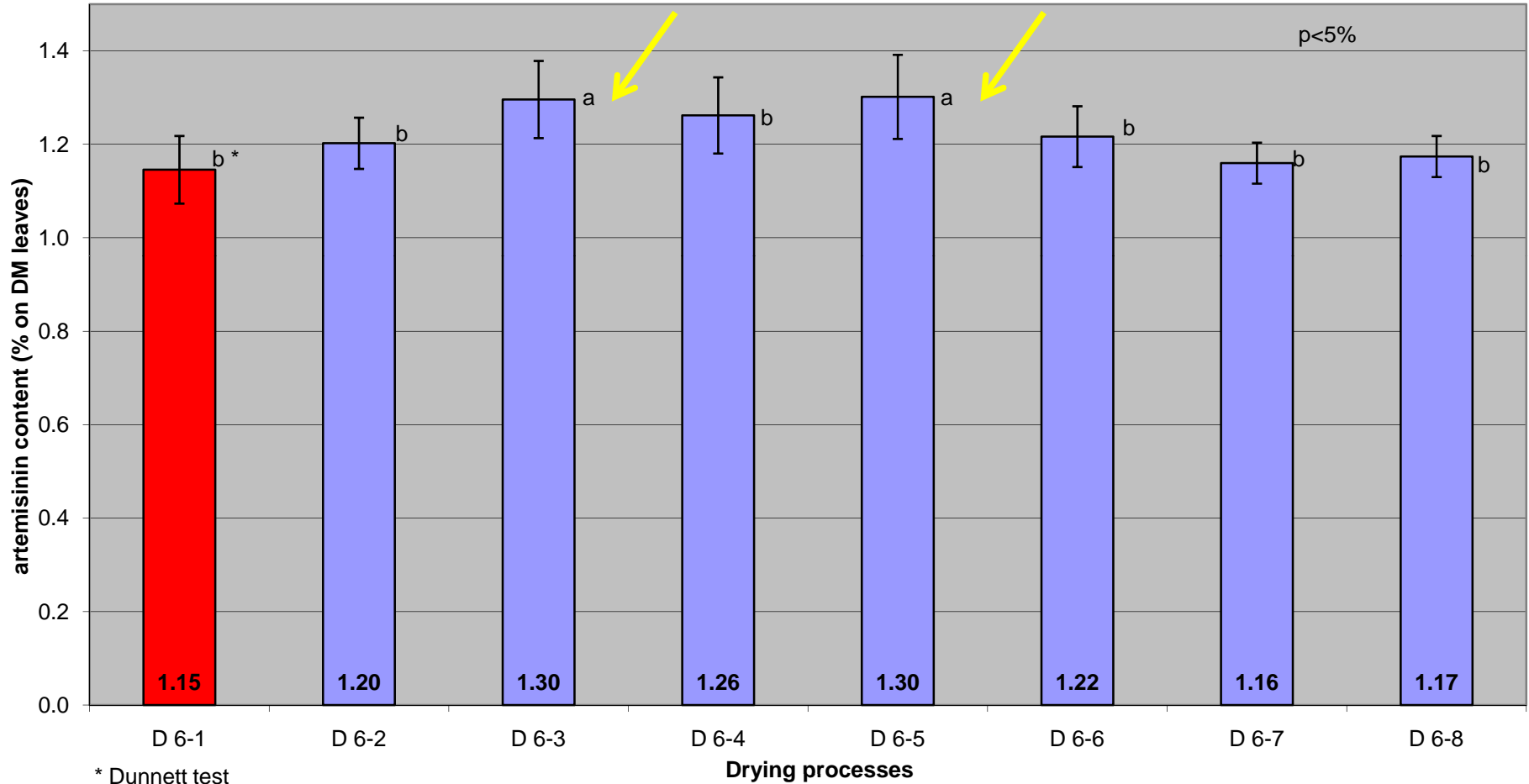


Drying in March 2009



* Dunnett test

Drying in July 2009



	artemisinin content (% on DM)
Drying season Long rainy season - March 2009 (local variety) Small rainy season - July 2009 (Artemis F1 variety)	p<1% 0,92 b 1,24 a
Drying processes Traditionnal drying on mat 1 layer (D5-1 & D6-1) Drying on mat 1 layer, 100% open air (D5-2 & D6-2) Drying on mat 4 layers, 100% open air (D5-4 & D6-3) Drying on trestles, thick layer rather tamped, 100% open air (D5-5 & D6-5)	p<1% 0,99 c 1,03 c 1,11 b 1,18 a
Interaction	p>5%

Conclusions

- long drying durations, up to 3 weeks did not cause damage, well managed it can increase artemisinin content
- to cover plants during night or in case of rain has no effect
- the color of leaves is not a criteria for quality