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(WP[®])

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Effect of kaolin clay on pomegranate fruits sunburn

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Abstract

Sunburn of pomegranate fruits, is one of the most important agent causing losses in Iran and other pomegranate producing countries which reduce the quantity and quality of the product. Application of the kaolin particle film might be an alternative for control of the pomegranate fruit sunburn. To assess the impact of kaolin, trials were conducted in the fields on Malas and Galoobarik varieties of pomegranate during 2009 in Saveh and Garmsar regions (central part of Iran). Two concentrations of kaolin clay (Sepidan[®] WP) (3 and 5%) were sprayed over the whole canopy and fruits, four times at 4–5-week intervals from early May to early September. Based on the field studies, the rates of fruits sunburn were 4.15 and 1.77 for control and kaolin (5%) treatment respectively. Also, the high sunburn of pomegranate fruits were recorded 44.7 and 4.2% for control and kaolin (5%) treatment respectively. The fruit cracking was reduced 64% and fruit weight mean were increased 9% in kaolin treatments in comparison with the control treatment. Spray of kaolin 5% on pomegranate trees was no evil-effect on leaves chlorophyll and photosynthesis.

Key words: Pomegranate, fruit sunburn, fruit cracking, kaolin, chlorophyll, photosynthesis

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.(Yazici *et al.*, 2005)

Punica granatum L.

Punicaceae

.(Melgareo *et al.*, 2003)

.(Mohseni, 2010)

.(Shakeri, 2003)

.(Ranjbar *et al.*, 2004)

.(Ranjbar *et al.*, 2004)

.(Mohseni, 2010)

.(Shakeri, 2003)

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.(Ranjbar *et al.*, 2004)

.(Mohseni, 2010)

Vapogard® E Sunshield®

.(Yuri *et al.*, 2002)

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% (...) (Yazici *et al.*, 2005)

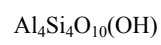
(Steiman *et al.*, 2007) (Parchomloohuk and Meheriuk, 1996)

(Glenn *et al.*, 1999)

(Puterka and Glenn, 2005)

(Shakeri, 2003)

(Mertens-Talcott *et al.*, 2006; Mousavinejad *et al.*, 2009)



(Knight *et al.*, 2000)

(Chen *et al.*, 2008)

(Glenn *et al.*, 1999)

(Palitha *et al.*, 2010)

(Glenn and Puterka, 2005)

Glenn *et al.*,)

(1999; Glenn and Puterka, 2005; Wand *et al.*, 2006)

(Gindaba and Wand, 2007; Wand *et al.*, 2006)

(Wu and Guo, 2005)

(Bota *et al.*, 2001)

(WP[®])
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Photosynthesis System

(CID Inc., USA) CI-340 Hand-Held

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(S1) =

(S2) = ()

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($\mu\text{MolCO}_2\text{m}^{-2}\text{s}^{-1}$)

)

(S3) = (

SAS

(S4) = (

($\alpha=0.05$)

(S5) = ()

Log(x)

:

Sunburn rate=[(S1×1)+(S2×2)+(S3×3)+(S4×4)+(S5×5)]/n

The number of fruit: S1= without sunburn, S2= low sunburn, S3= medium sunburn, S4= high sunburn, S5= extra high sunburn, and n= The total number of tree fruits

($F_{2, 12}=44.89$; $P=0.0001$; C.V.=19.10%)

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Konica Minolta,) Minolta

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Table 2. The mean (\pm SE) of fruit sunburn in different treatments in Saveh and Garmsar regions*

Treatment	Saveh region	Garmsar region
Kaolin (5%)	2.66 \pm 0.02 c	1.28 \pm 0.06 b
Kaolin (3%)	3.03 \pm 0.13 b	1.63 \pm 0.35 b
Control	3.95 \pm 0.16 a	4.36 \pm 0.54 a

* Means followed by the same letter in each column are not significantly different at 1%, according to Duncan's multiple-range test ($P < 0.05$, DMRT)

Table 1. The mean (\pm SE) of fruit sunburn and fruit cracking in different treatments*

Treatment	Fruit sunburn index	Fruit cracking (%)
Kaolin (5%)	1.77 \pm 0.18 b	15.63 \pm 2.78 b
Kaolin (3%)	2.33 \pm 0.30 b	23.05 \pm 4.10 b
Control	4.15 \pm 0.27 a	43.68 \pm 3.47 a

* Means followed by the same letter in each column are not significantly different at 5%, according to Duncan's multiple-range test ($P < 0.05$, DMRT)

($F_{2, 12} = 22.12$; $P = 0.0001$; C.V. = 16.57%)

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($F_{2, 6} = 1.62$; $P = 0.0001$; C.V. = 6.93%)

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($F_{2, 6} = 0.92$; $P = 0.0010$; C.V. = 10.81%)

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($r = 0.8859$)

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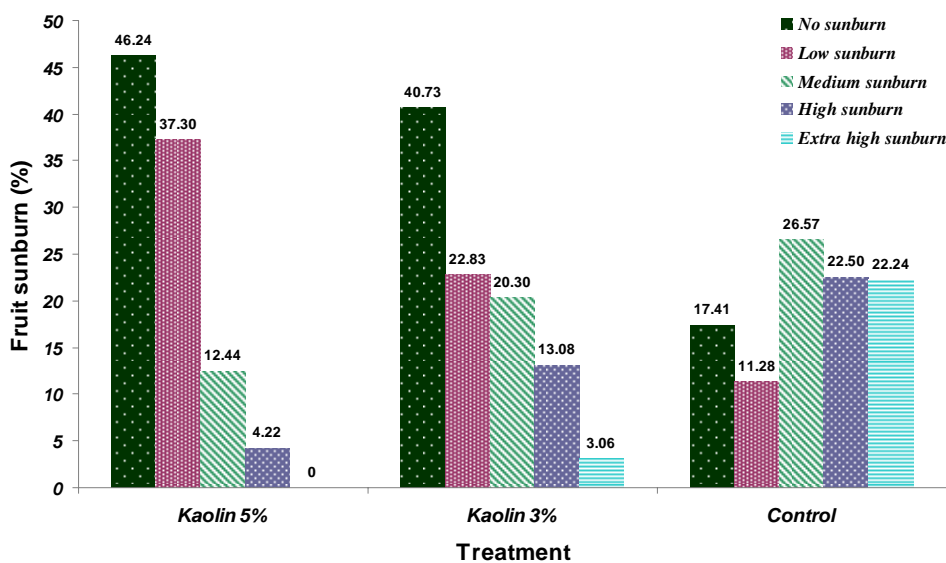


Fig. 1. Different levels of pomegranate fruits sunburn percentage in different treatments

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.($F_{2, 12}=2.35$; $P=0.1373$; C.V.=9.08%)

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Paired t-test, $t=1.271$, $F=1.44$,)

.($p<0.6440$) .($F_{2, 11}=1.15$; $P=0.5283$; C.V.=4.79%)

Table 3. The mean (\pm SE) of fruit weight and leaf chlorophyll index in different treatments*

Treatment	() Fruit weight (gr)	Leaf chlorophyll index
Kaolin (5%)	186.1 \pm 9.26 a	57.30 \pm 1.53 a
Kaolin (3%)	181.2 \pm 7.33 a	56.81 \pm 2.01 a
Control	169.0 \pm 9.06 a	55.70 \pm 2.72 a

* Means followed by the same letter in each column are not significantly different at 5%, according to Duncan's multiple-range test ($P<0.05$, DMRT)

Table 4. The photosynthesis mean(\pm SE) in different treatments*

Treatment	Photosynthesis (μ MolCO ₂ /m ² /s)
Kaolin (5%)	0.23 \pm 2.88
Control	0.19 \pm 2.50

(Yazici and Kayanak, 2009)

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() μ MolCO₂/m²/s / /

(Weerakkody *et al.*, 2010)

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(Sorround[®])

%

Mollar de Elche

/ /

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(Weerakkody *et al.*, 2010)

(Melgareo *et al.*, 2003)

Hicaznar

(Thumas *et al.*, 2004; Wonsche *et al.*, 2002)

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%

Gala

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Braeburn

.(Glenn *et al.*, 2002)

(Melgareo *et al.*, 2003)

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.(Yazici and Kayanak, 2009)

.(Rogiers *et al.*, 2001)

.(Sheikhali *et al.*, 2009; Rafiei *et al.*, 2011)

.(Moriani *et al.*, 2003)

.(McCarthy, 1997)

.(Glenn and Puterka, 2005)

(...)

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.(Steiman *et al.*, 2007)

.(Wu and Guo, 2005)

)

%

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.(Steiman *et al.*, 2007)

.(Tanaka, 2006)

.(Glenn, 2010)

.(Kerns and Wright, 2000)

.(Sairam *et al.*, 1997)

.(Pace *et al.*, 2006)

Weerakkody *et al.*,)

.(2010

%

(mMol Fe₂L⁻¹)

.(Weerakkody *et al.*, 2010)

.(Russo and Diaz-Perez, 2005)

%

.(Glenn and Puterka, 2005; Glenn, 2010)

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