Effects of potassium nutrition on fruit yield and quality of the 'Maltaise' citrus cultivar (Citrus sinensis, L.)

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- Potassium is a major element with an important effect on fruit yield and quality.
- Tree demand for K is high during fruit growth and maturation
- Potassium could be applied with different methods and is very mobile on the tree

Objectives:

- This work aims to evaluate the effect of potassium supply on vegetative growth and production (yield and fruit quality) in citrus.

Material and Method

- Commercial orchard located in the Enfidha region (Centre of Tunisia)
- Semi arid climate
- Sandy soil
- 'Maltaise' cultivar grafted on sour orange.
- Trees are thirty-year-old.

- Three treatments were used:

  K200: 200% of potassium tree requirement

  K100: 100% of potassium tree requirement

  K0: Without potassium supply

The potassium rate calculation was done based on the estimation of yield and pruned wood.

100% Tree requirement was estimated to be equal to 0.6 Kg of sulphate of potash (52%K_2O).

Treatments were applied during the fruit growth period in three times supply in August, September and October.

No other mineral nutrition was done in the orchard.

Potassium was given by fertigation using potassium sulfate (K2SO4).

Measured parameters:

- Shoot length
- Yield
- Fruit Quality

Experiment were done for two successive years: 2012 and 2013.

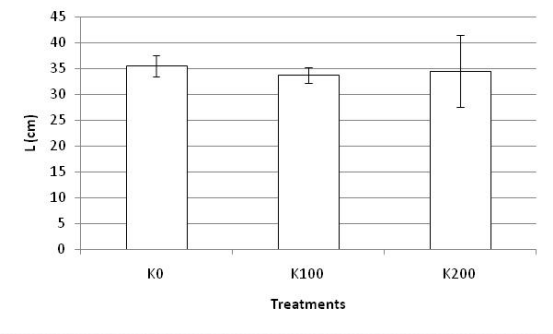
Results

Leaf mineral analysis

Treatment	K (%DM)	Ca (%DM)	Na (%DM)
K 200	0.35 ± 0.012	0.63 ± 0.032	0.13 ± 0.006
K 100	0.22 ± 0.007	0.79 ± 0.024	0.17 ± 0.006
K 0	0.22 ± 0.010	0.62 ± 0.032	0.14 ± 0.17

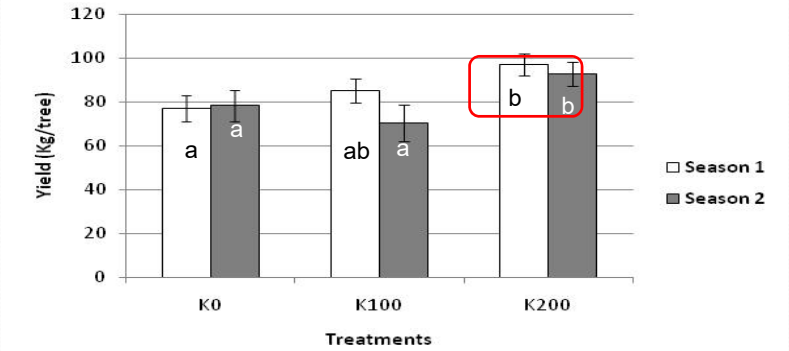
K200 treatment improves the leaf mineral content particularly for the potassium.

- ***Vegetative growth: Shoot length***



The vegetative growth shows no significant difference between treatments. The average shoot length ranged around 35 cm for all treatments.

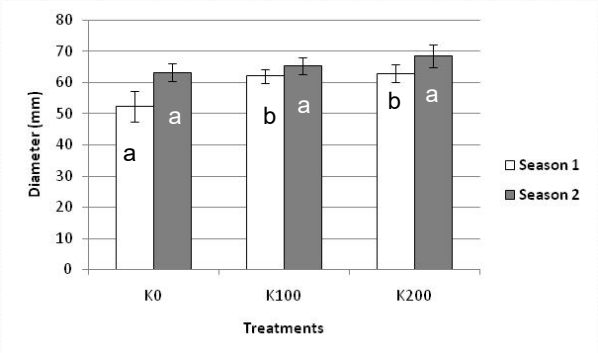
- ***Average yield per tree:***



A clear improvement of fruit yield was observed in K200 treatment for the two years with an average yield ranged between 90 and 100 Kg per tree

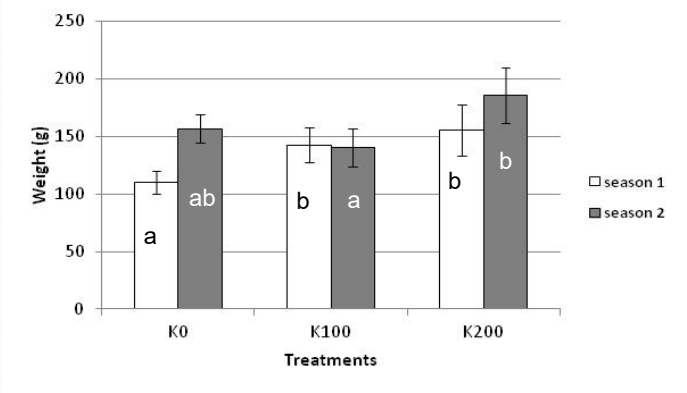
The control yield did not exceed 80 Kg per tree.

- ***Average fruit diameter:***



Potassium treatments slightly increased fruit diameter especially in the first year of the experiment.

- ***Average fruit weight:***



K200 treatments increased significantly fruit weight compared to control and K100

- ***Fruit color***

Table 1: Average values of the color parameters of Lightness (L^*), Chroma value (C^*) and hue angle (h^*) for each treatment (K0, K100 and K200 respectively treatments with 0, 100% and 200% of tree requirement). Values followed by the same letter are not significantly different at 0.05.

	Lightness (L)*	Chroma Value (C*)	Hue Angle (h*)
K0	71.01 *a*	74.79 *a*	1.39 *a*
K100	69.55 *a*	66.40 *b*	1.52 *a*
K200	73.29 *a*	65.72 *b*	-1.47 *b*

Trees receiving K200 treatment showed more colorated fruits comparatively to K control.

- ***Orange juice characteristics***

Table 2: Total soluble solids (TSS) in °Brix, Titrable acidity (TA) in % and TSS/TA for each treatment (K0, K100 and K200 respectively treatments with 0, 100% and 200% of tree requirement). Values followed by the same letter are not significantly different at 0.05.

		K0	K100	K200
Season 1	TSS (°Brix)	10.43 a	10.60 a	10.40 a
	TA (%)	1.7 a	1.99 a	1.63 a
Season 2	TSS (°Brix)	12.1 a	12.06 a	11.83 a
	TA (%)	1.29 a	1.47 a	2.08 b

No effect was observed on fruit quality for the two years experiment

Conclusion

- No significant differences on vegetative growth between treatments.
- The potassium supply increased yield especially with the K200 treatment.
- With the same treatment fruit color was ameliorated: oranges lost the green color in favour of yellow and red colors.
- No effect was observed on fruit juice characteristics.

- The potassium has been given less attention while it is a determinant factor of yield and fruit quality.

Thank you

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