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PRODUCTIVITY STUDY OF FOUR AVOCADO CULTIVARS IN ALGARVE REGION

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SUMMARY

With the purpose to proceed at productivity study of four avocado cultivars and influence of four rootstocks, Direcção Regional de Agricultura do Algarve has established at Centro de Experimentação Horto – Frutícola do Patacão, on May 1983, avocado trials. From several parameters, which have been registered, some results were already published. Only data relating to cultivar production were not yet matter of any writing reference. For the productivity were selected 'Hass', 'Reed', 'Bacon' and 'Fuerte' as scion cultivars, as well as 'Topa-Topa', 'Lula', 'Antilhano of Canárias' and 'Duke 7' as rootstocks. Along fourteen years of observations (1985 – 1998), it was confirmed a significant effect of cultivar x rootstock interaction on the production, being in the limelight the 'Bacon' x Lula symbiont.

KEY WORDS: *Persea americana* Mill.,Avocado, cultivar evaluation, Rootstock.

INTRODUCTION

Our current Decennium has emphasised the option of the fruit consumer, recognising, in turn, the term "New Fruit-Growing", known also as "Tropical Fruits". This tendency, when change of nutritious diet is taken into consideration, will increase accordingly, as long as are known fruit qualities of this group which reach a superior nutritious level to some Mediterranean fruits.

Among the agrarian pursuits developed in the Algarve, the fruit tree is a relevant production. Bearing in mind desire diversification of production, plus southern Portugal's advantageous conditions, the vocational ambition of the Algarve farmer is this: conception and understanding, throughout the last few years, of the ever increasing importance and culture of new species.

The avocado isn't included here, as its introduction to the Algarve is too recent.

It's absolutely essential to understand the avocado's adaptation to local conditions as well as its productive ability. As a result, Direcção Regional de Agricultura do Algarve are putting into effect an experimental work based on trials established from 1983.

Using four previously selected cultivars, the purpose of the present study is to gain a knowledge of species productivity, as well as knowledge of the influence of used rootstocks.

MATERIAL AND METHODS

The trial started in 1985 from plot 1 of Centro de Experimentação Horto-Frutícola do Patacão, within the council of Faro, at an orchard fully grown as of May 1983 - density 313 trees, spacing of 8 m x 4 m and established on a clay loam soil. The orchard area was 5.900 m^2.

'Hass', 'Bacon', 'Fuerte' and 'Reed' cultivars were used, grafted on 'Topa-Topa', 'Lula', 'Antilhano das Canarias' and 'Duke 7'. Grafted plants at 'Lula' and 'Duke 7' have emanated from, respectively, Blanco Nursery, of Velez-Malaga (Spain) and Brokaw Nursery, of California (U.S.A).

The remainder were obtained from Centro de Experimentação Agrária de Tavira (Algarve - Portugal) using 'Topa-Topa' seed and four cultivars vegetative material, then in study, from Estacion Experimental "La Mayora" of Algarrobo-Costa (Spain). Antilhano seed was acquired from Instituto Canario de Investigaciones Agrarias, of Tenerife (Spain).

Experimental design was of random blocks, with four repetitions and 32 plants per plot, with two plants of the same combination, cultivar and rootstock on each plot.
The grafting type in use was cleft-graft.

Irrigation, during the first years, took place through a micro-tube of 3 mm x 1 mm with a 4 liter·h^{-1} debit. Subsequently the system was enhanced by self-regulated micro-sprayers with a 70 liter·h^{-1} debit.

The overall surrounds of the trial were installed with a wind break fixed at the foot of the avocado trees.

Applied fertilization was based on results of soil and leaf analysis. At this work yield results are statistically treated.

RESULTS AND DISCUSSION

According to statistical study (Table 1), on the mean of observation years (1985 - 1998), there was significant effect ($P \leq 0.005$) of cultivar x rootstock interaction on yield (kg·$tree^{-1}$).

Attending to the fruit number/tree (Table 2), such interaction was not significant ($P > 0.05$).

Effects of cultivar or rootstock as independents, were, however, at both cases, highly significant ($P \leq 0.001$).

the Duncan test (Figure 1) confirms that the best combination, in terms of production, was the combination of ‘Lula’ x ‘Bacon’. There were, however, no significant differences when the same cultivar was grafted on remaining rootstocks, likewise ‘Fuerte’ on other rootstocks, with the exception of Antilhano - this otherwise leads average lower productions with ‘Hass’, ‘Fuerte’ and ‘Reed’ cultivars.

Although without significant differences among the number of fruit ($P>0.05$), highest average productions were obtained at the cost of higher numbers of fruit.

As Figure 2 shows, the most productive cultivar, independent of rootstock, was ‘Bacon’. With relation to the fruit number, as ‘Hass’ and ‘Bacon’ cultivars, there aren’t significant differences.

Excluding the influence of cultivar, all rootstocks - when production (Figure 3) and the number of fruit were taken into consideration - were superior to Antilhano. Finally when considering the variable year, yield differences were highly significant ($P\leq0.001$) (Table 1). The most productive year was 1998 (Figure 4). Results show, however, from 1991 on, the tendency is for stabilisation of production. Differences were discovered among average productions - ultimately due to conditions occurring annually, more or less suitable for the crop.

CONCLUSIONS

Following data analysis obtained, some significant conclusions can be detailed. There is a significant effect with the interaction of cultivar and rootstock, ‘Lula’ x ‘Bacon’ the best production example. There are no significant differences for that on remaining rootstocks, and the cultivar Fuerte on all rootstocks, with the exception of Antilhano.

The rootstock Antilhano leads average lower productions with ‘Hass’, ‘Fuerte’ and ‘Reed’. Independently of rootstock, ‘Bacon’ was the most productive cultivar.

The results show that the tendency, since 1991, has been towards a stabilisation in production.

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Table 1. Analysis of variance – Production (kg·tree^{-1}).

Source of variation	d.f.	Sum of squares (SQ)	Mean square	F-ratio
Replication	3	1,7278E10	5,75933E9	9,22 ***
Year	13	3,66101E11	2,81616E10	45,10 ***
Rootstock (R)	3	1,46378E10	4,87926E9	7,81 ***
Cultivar (V)	3	2,16679E10	7,22262E9	11,57 ***
Interaction (R × V)	9	1,12852E10	1,25391E9	2,01 *
Residual	1383	8,63643E11	6,24471E8	
Total	1414	1,29461E12		

* - $P \leq 0,05$; *** - $P \leq 0,001$

Table 2. Analysis of variance – Production (number of fruits per tree)

Source of variation	d.f.	Sum of squares (SQ)	Mean square	F-ratio
Replication	3	96504,7	32168,2	3,210 **
Year	13	5,72218E6	442476,0	44,200 ***
Rootstock (R)	3	215915,0	71971,6	7,190 ***
Cultivar (V)	3	761958,0	253986,0	25,380 ***
Interaction (R × V)	9	147425,0	16380,6	1,64 n.s.
Residual	1383	1,38418E7	10008,5	
Total	1414	2,08158E7		

n.s. – $P > 0,05$; * - $P \leq 0,05$; ** - $P \leq 0,01$; *** - $P \leq 0,001$

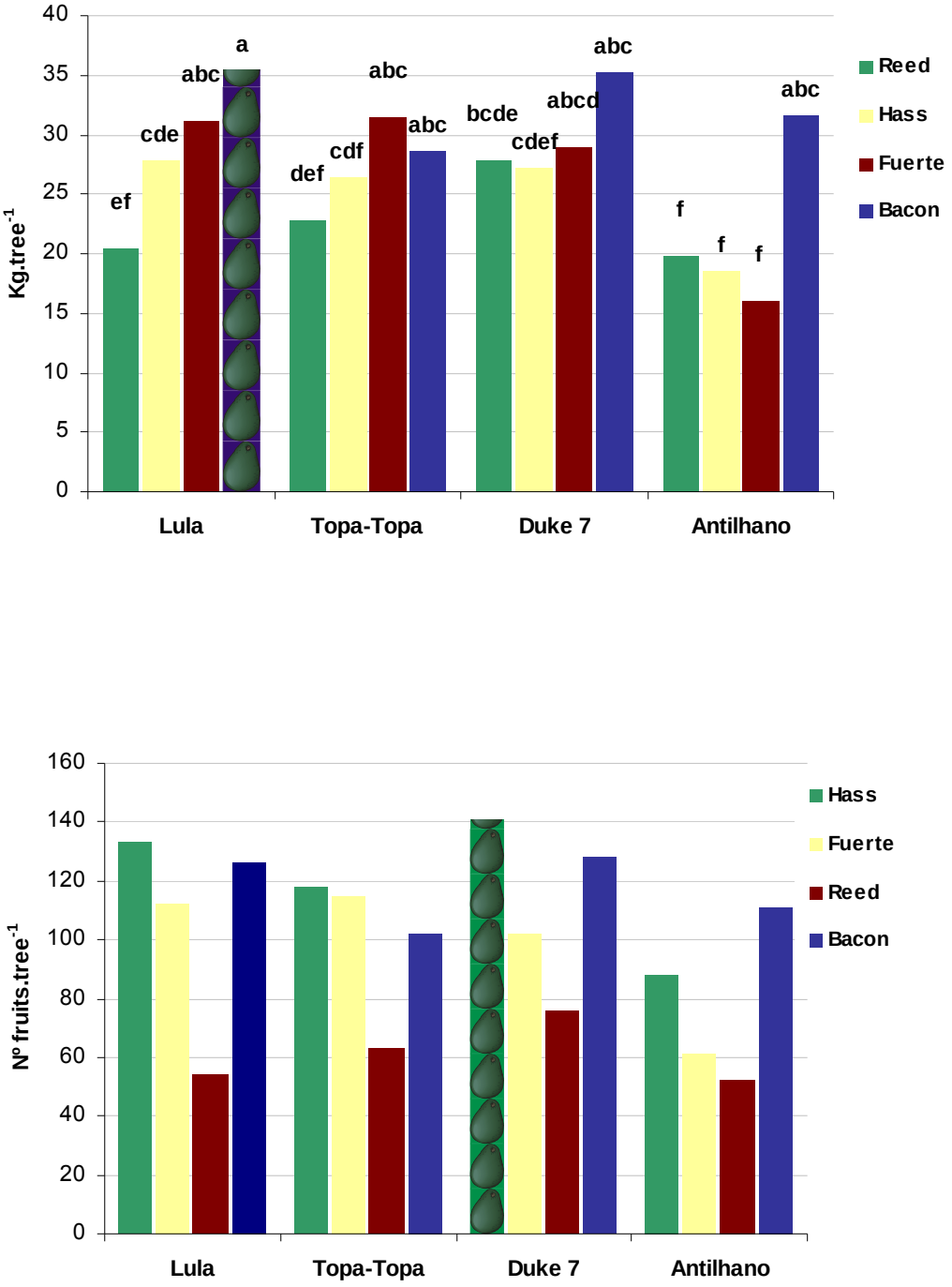

Figure 1. Average effects of cultivar x rootstock interaction on mean yield.

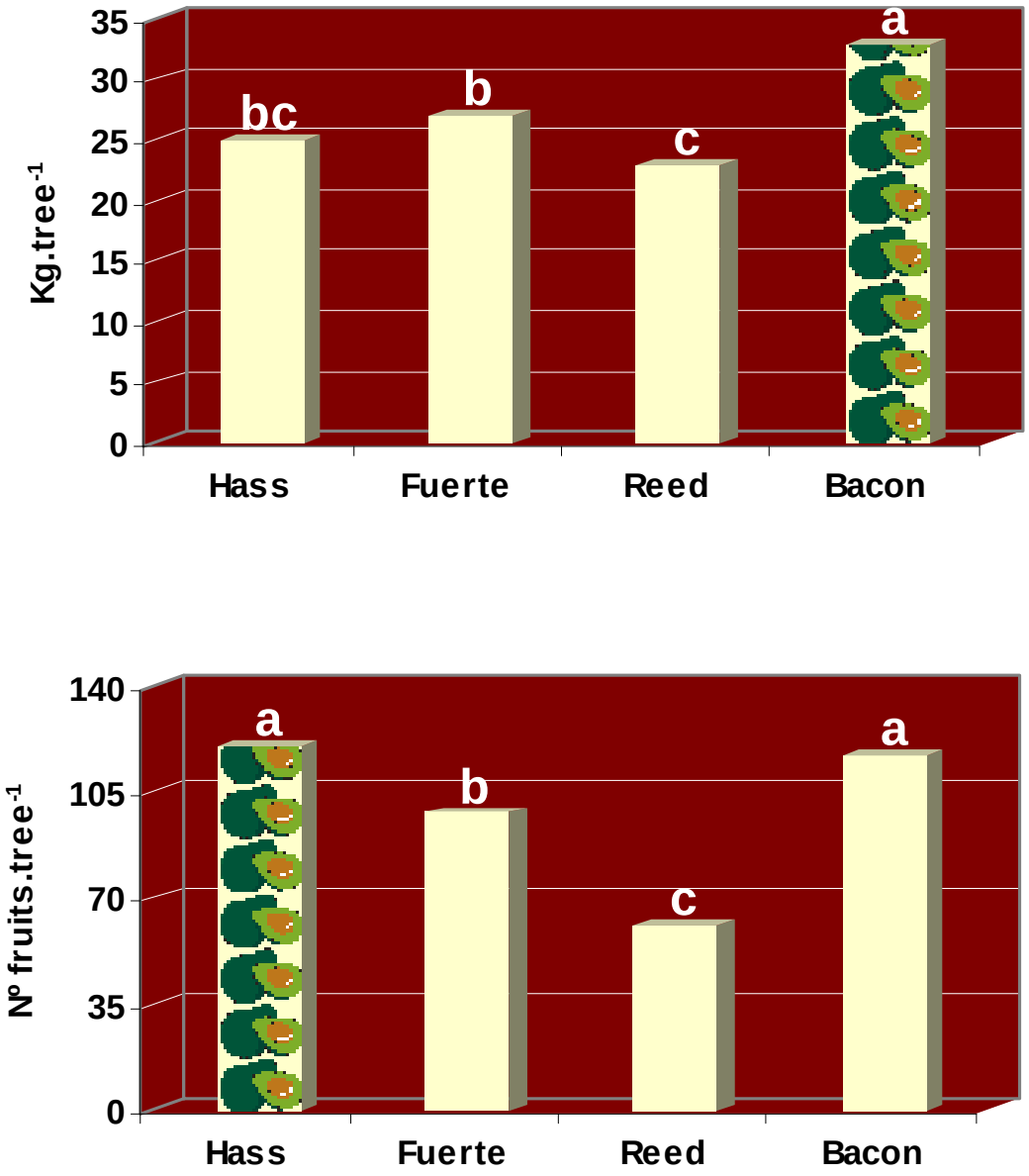

Figure 2. Average effects of cultivar on production.

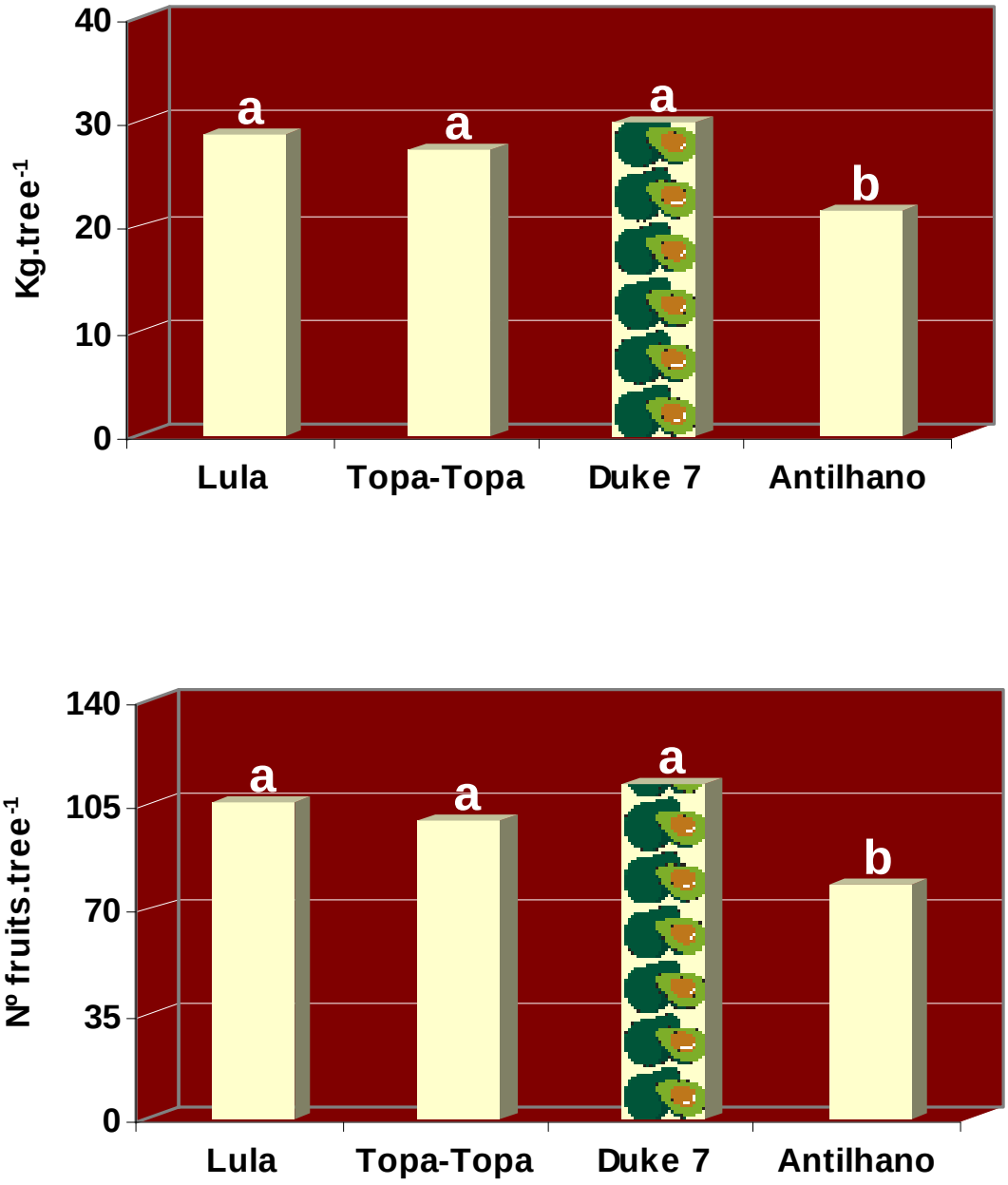

Figure 3. Average effects of rootstock on production.

Figure 4. Average production over the length of 14 years of tests (1985-1998).