GROWTH AND PRODUCTIVITY OF COFFEE AND MACADAMIA CULTIVARS IN INTERCROPPING IRRIGATED

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INTRODUCTION

Research results show the beneficial effects of shade to coffee plants, reducing wind speed and temperature range. Macadamia trees are productive and offer little competition to coffee, having great potential to offer advantages of afforestation and increase the income of farmers.

OBJECTIVE

The aim of this study was to evaluate the growth and productivity of arabica coffee (*Coffea arabica*) and cultivars of macadamia trees (*Macadamia integrifolia*) in intercropping cultivation under irrigation.

MATERIAL AND METHODS

Location: carried out in Dois Córregos, SP, Brazil (22º 21' S and 48º 22' W and 753 m asl).

Soil: sand-textured Red-Yelow Latosol (Oxisol). At 0-20 cm depth, presented: organic matter, 17 g dm^{-3}; pH ($CaCl_2$), 5.2; P(resin), 5 mg dm^{-3}; K, Ca, and Mg, 0.8, 9.0, and 7.0 $mmol_c$ dm^{-3}, respectivamente, base saturation, 49%.

Design and treatments: The experiment was conducted in completely randomized experimental design with three replications. For the macadamia were considered nine treatments (HAES 344, HAES 660, HAES 816, IAC 9-20, IAC 4-12B, IAC 4-20, IAC 9-20 without pruning, IAC 4-12B without pruning, IAC 4 -20 without pruning), and coffee growing ten treatments were considered, in other words, coffee intercropped (nine treatments above) and an additional treatment (sole coffee).

Planting date: Februery 2006.

RESULTS

Plant height and canopy diameter of macadamia trees, in the seventh year after planting, and cumulative nut and almond yields (five harvests).

Treatments	Macadamia			
	Plant height (m)	Canopy diameter (m)	Nut yield (kg $plant^{-1}$)	Almond yield (kg $plant^{-1}$)
HAES 816	5.70ab	4.33cd	37.5bc	13.7ab
HAES 344	6.03ab	4.50bc	34.4 c	9.5bc
HAES 660	6.10a	4.00d	25.7c	8.0c
IAC 9-20 pruned	5.40b	4.90a	31.9c	9.1c
IAC 4-12B pruned	5.50ab	4.90a	34.3c	9.8bc
IAC 4- 20 pruned	4.53c	4.67abc	30.9c	10.1c
IAC 9-20	5.87ab	4.90a	57.2a	15.1a
IAC 4-12B	5.63ab	4.90a	60.4a	17.6a
IAC 4-20	4.70c	4.73ab	48.1ab	14.8a
Probability (*P*>F)	<0.001	<0.001	<0.001	<0.001
CV(%)	4.3	2.9	11.7	12.5

Plant height and stem diameter of coffee trees, in the seventh year after planting, and cumulative coffee yield (five harvests).

Treatments	Coffee		
	Plant height (m)	Stem diameter (mm)	Coffee yield (Mg ha^{-1})
Sole	2.53e	69.3a	15.6a
HAES 816	2.68abcd	64.8bc	13.8b
HAES 344	2.74abc	64.9bc	13.5b
HAES 660	2.61cde	64.8bc	14.1ab
IAC 9-20 pruned	2.59de	68.6ab	14.5ab
IAC 4-12B pruned	2.63cde	67.3ab	13.9b
IAC 4- 20 pruned	2.62cde	67.4ab	13.7b
IAC 9-20	2.79ab	61.8c	10.9c
IAC 4-12B	2.78ab	62.1c	10.4c
IAC 4-20	2.85a	62.1c	11.8c
Probability (*P*>F)	<0.001	<0.001	<0.001
CV(%)	1.7	2.1	4.0

Values followed by same lower case letter in the columns are not significantly different at $P \leq 0.05$ according to Tukey test.

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CONCLUSION

Brazilian cultivars of macadamia (IAC 4-12B, IAC 9-20, and IAC 4-20), are more productive; however, they take more pruning in order to be kept in mechanized systems, the yields of which are on the level with Hawaiian cultivars (HAES 344, HAES 660, HAES 816). Coffee trees subjected to shade had greater height and smaller measures of stem diameter. In the intercropping with Brazilian cultivars under free growth there was a decrease in the coffee yield in relation to sole crop, but no difference in the intercropping with the Hawaiian cultivars or Brazilian cultivars that received pruning. Hence, in intercropping systems fit for mechanization, cultivar HAES 816 is the best option, while in non-mechanized systems and/or provisional intercropping with arabica coffee, IAC 4-12B is the best option, for being the most productive.