INTERCROPPING AND MONOCROPPING OF ARABICA COFFEE AND MACADAMIA NUT WITH AND WITHOUT DRIP IRRIGATION

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INTRODUCTION

The intercropped growth of Arabica coffee (*Coffea arabica* L.) with woody plants has proven beneficial to the crop. This production system allows the farmer an additional income from the second crop, which makes it favorable to the producer, since the production biennial oscillation and the price of coffee at certain times, lead to financial problems the grower. However, studies about intercropping of coffee with macadamia nut (*Macadamia integrifolia* Maiden & Betche) are almost nonexistent.

OBJECTIVE

The objective of this study was to evaluate the growth and yield of Arabica coffee (cv. Obatã - IAC 1669-20) and macadamia nut (cv. IAC 9-20 grafted on rootstock Aloha - IAC 10-14) in intercropping and monocropping systems, with and without drip 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: Experiment was arranged in a 3x2 factorial scheme, with three growing systems (A – macadamia trees sole cropping; B – coffee trees sole cropping; and C – macadamia trees intercropped with coffee trees), two water regimes (with and without drip irrigation) and ten replications.

Planting date: Februery 2006.

Drip irrigation: 2006 = 205 mm; 2007 = 237 mm; 2008 = 321 mm; 2009 = 167 mm; 2010 = 288 mm; 2011 = 152 mm; 2012 = 234 mm.

RESULTS

Coffee bean yield (kg ha^{-1}) as affected by growing system and water regime.

Growing system	Water regime		Average
	Rainfed	Drip irrigated	
		2008	
Sole	606aB	1,566aA	1,086
Intercropped	636aB	1,422bA	1,026
Average	618	1,494	
		2009	
Sole	1,890	2,868	2,376a
Intercropped	1,854	2,898	2,376a
Average	1,872B	2,880A	
		2010	
Sole	3,930bB	4,968aA	4,452
Intercropped	4,506aB	5,016aA	4,764
Average	4,218	4,992	
		2011	
Sole	1,266	918	1,092a
Intercropped	1,218	1,038	1,128a
Average	1,242A	978B	
		2012	
Sole	1,470bB	5,454aA	3,462
Intercropped	1,908aB	4,782bA	3,342
Average	1,692	5,118	
		Total	
Sole	9,162bB	15,774aA	12,468
Intercropped	10,122aB	15,054aA	12,636
Average	9,642	15,462	

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

Macadamia almond yield (kg ha^{-1}) as affected by growing system and water regime.

Growing system	Water regime		Average
	Rainfed	Drip irrigated	
		2009	
Sole	2.1bB	13.0bA	7.6
Intercropped	9.4aB	40.2aA	24.8
Average	5.7	26.6	
		2010	
Sole	13.8	88.6	51.2b
Intercropped	65.3	140.0	102.7a
Average	39.6B	114.3A	
		2011	
Sole	79.2bB	197.0bA	138.1
Intercropped	154.5aB	534.7aA	344.6
Average	116.8	365.8	
		2012	
Sole	139.2	300.7	219.9a
Intercropped	178.1	360.4	269.2a
Average	158.7B	330.5A	
		2013	
Sole	256.1bB	755.0aA	489.9
Intercropped	332.6aB	647.3bA	505.5
Average	294.4	701.1	
		Total	
Sole	490.4	1,354.4	922.4b
Intercropped	739.9	1,722.5	1,231.2a
Average	615.1B	1,538.4A	

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

CONCLUSION

Macadamia trees reached a higher growth and accelerated production when intercropped with coffee trees and under irrigation. The macadamia nut production and quality were benefited by intercropping and irrigation, while almond yield under irrigated intercropping ranked 27%, 133% and 251% above irrigated sole cropping, rainfed intercropping, and rainfed sole cropping, respectively. On the average, coffee production ranked 60% higher under irrigation, but was not influenced by intercropping in such condition. In rainfed condition, intercropping increased coffee yield by 10%.

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