

Efficiency of Slow release fertilizer Blend (Polyblen®) in *Coffea arabica* at Minas Gerais County 2011/2012 and 2012/2013 season.

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ABSTRACT

The study evaluated the growth and productivity of *Coffea arabica* trees fertilized with different doses of Polyblen® 21-00-21 (slow and controlled release fertilizer) compared to conventional soluble fertilizer. The experiment took place at Mãe Rainha Farm located in Eloi Mendes – MG. The experimental protocol design was a randomized block (DBC) with 5 treatments and 4 replications. Conventional Blend 20-00-20 has split into three application totaling 416 kg ha⁻¹ of N and K₂O as a standard dose of fertilization; 3 rates of Polyblen 21 00 21 (100%, 75% and 50% of Standard rate) in a single topdressing application and a control without fertilizer. The results showed that all the treatments with Polyblen® have reached the highest yield, regardless of the percentage of N and K supply. Analyzing the two seasons separately, Polyblen's showed higher yield than of conventional fertilizer with soluble sources. The average of two years Polyblen® increased approximately 22% yield compared to conventional fertilization. The balance rate between Polyblen (21-00-21) and conventional blend (20 00 20) was 79%. Thus, the slow-release fertilizer (21-00-21 Polyblen®) promoted significant increases productivity and vegetative growth.

INTRODUCTION

The fertilizers named Polyblen® have their urea and potassium chloride grains coated with organic polymers and sulfur layer. It allows slow and controlled release during 5 to 6 months of nutrients releasing to soil solution. This way, there is application cost reduce once there is only one application during this 5 to 6 months period. When there is the use of conventional urea and potassium chloride, soluble fertilizers, there are 3 to 4 times soil application per season. The slow and controlled release fertilizers have high agronomic efficiency where can be used reduction of doses comparing to conventional urea and potassium chloride, soluble fertilizers.

The objective of the study was to evaluate growth and yield characters of coffee trees, *Coffea arabica*, with different doses of Polyblen® 21-00-21 compared to conventional urea and potassium chloride, soluble fertilizers 20-00-20 during two years.

MATERIALS AND METHODS

The experiment took place at Mãe Rainha Farm located in Eloi Mendes city, Minas Gerais State, Brazil (21°34'58,84"S; 45°37'18,19"W; Alt. 873 m). The experimental design was randomized blocks with five treatments and four repetitions. Conventional Blend 20-00-20 has split into three applications every 45 days starting on October totaling 416 kg ha⁻¹ of N and K₂O as a standard dose of soil fertilization on each one of two years evaluated. The slow and controlled release fertilizers Polyblen® 21-00-21, were applied in 3 doses (100%, 75% and 50% of Standard dose) in a single topdressing application on October and a control without N and K₂O soil fertilizer.

During two seasons (2011/2012 and 2012/2013), the characteristic evaluated were: the plagiotropic branches growth, the yield of beans and the nutrients (N and K) content on the leaves.

RESULTS AND DISCUSSION

In analysis of variance test the most of characteristics evaluated had significant effects.

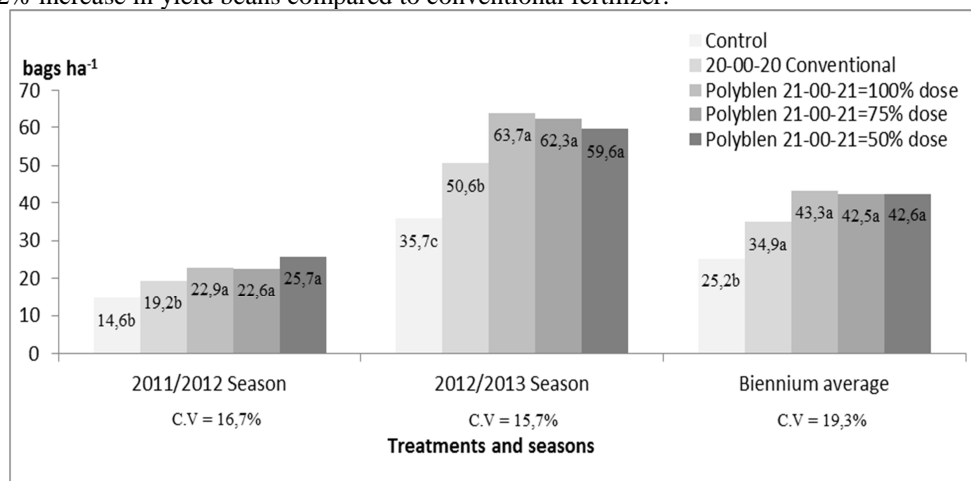
Table 1: Coffee trees Plagiotropic branches growth. Length of primary plagiotropic branche (Length PB) in centimeter; number of nodes on the primary plagiotropic branch (NNPB) of 2011/2012 e 2012/2013 seasons. And biennium average Elói Mendes-MG, 2012.

Treatment	2011/2012 Season		2012/2013 Season		Biennium average	
	Length PB (cm)	NNPB	Length PB (cm)	NNPB	Length PB (cm)	NNPB
Control	8,06 b	2,2 b	6,00 b	2,15 b	7,08 c	2,27 c
20-00-20 Conventional	16,0 a	4,0 a	6,20 b	2,25 b	11,00 b	3,16 b
Polyblen 21-00-21=100% dose	19,1 a	4,9 a	8,03 a	3,20 a	13,57 a	4,04 a
Polyblen 21-00-21=75% dose	17,9 a	5,1 a	9,45 a	3,47 a	13,67 a	4,29 a
Polyblen 21-00-21=50% dose	19,1 a	4,9 a	8,18 a	3,20 a	13,64 a	4,04 a
C.V. (%)	11,23	17,5	21,37	19,34	8,44	11,25

Numbers with same letter on the columns do not differ significantly on 5% probability level by Scott Knott test.

In table 1, only the control treatment without N and K₂O soil fertilizer had lower growth of plagiotropic branches and number of nodes on the primary plagiotropic branch. From second season evaluated the treatments with Polyblen[®] 21-00-21, independently of doses, had showed higher values for both characteristics, including the biennium average.

All treatments with Polyblen[®] 21-00-21 showed the higher yields of beans (Fig. 1), independently of N and K₂O doses. Analyzing both seasons separately, Polyblen[®] 21-00-21 had better yields of beans than conventional fertilizers. On the biennium average, Polyblen[®] 21-00-21 contributed with 22% increase in yield beans compared to conventional fertilizer.



Numbers with same letter on the same season do not differ significantly on 5% probability level by Scott Knott test.

Fig. 1: Yield in bags (60 kg of beans) ha⁻¹ of 2011/2012 and 2012/2013 seasons and biennium average for different doses and sources of soil fertilizers. Elói Mendes-MG, 2012.

The response curve yield of beans on biennium average as a function of N and K₂O soil doses using Polyblen 21-00-21 in coffee trees fertilization shows the highest yields between 60 and 70% of N and K₂O soil doses. This behavior justifies slow and controlled release fertilizers Polyblen[®] 21-00-21 agronomic efficiency. Only one soil application on October month in each season could support effectively the yield potential and vegetative growth plants.

Fig. 2: Response curve yield of beans on biennium average as a function of N and K₂O soil doses using Polyblen 21-00-21 in coffee trees fertilization. Elói Mendes-MG, 2012

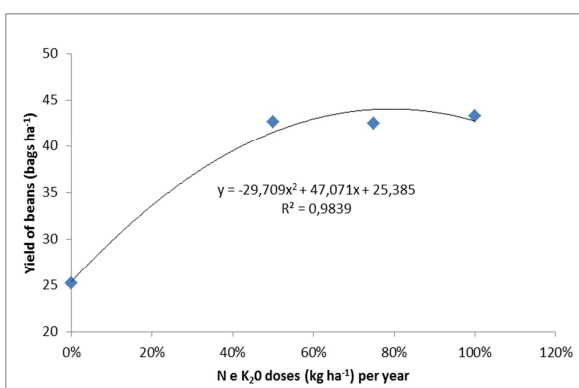


Table 2: N e K leaves content on 2011 June and 2012 June (harvest times) for different soil fertilizers doses and sources. Elói Mendes-MG, 2012.

Treatments	2011 June		2012 June	
	N	K	N	K
Control	2,3	1,7	2,6	2,4
Conventional	2,7	1,8	3,3	2,5
Polyblen 100% dose	2,8	2,0	2,9	2,4
Polyblen 75% dose	2,9	1,9	3,1	2,3
Polyblen 50% dose	2,9	1,7	3	2,5

Coffee tree plants receiving only one N and K₂O soil application per year on October of each season with Polyblen 21-00-21 maintained suitable N e K leaves contents until 2011 June and 2012 June (harvest times). In conclusion, this experiment demonstrated that the slow and controlled release fertilizers Polyblen[®] 21-00-21 provides yield of beans and vegetative growth plants increase. 79% of N and K₂O soil doses using Polyblen[®] 21-00-21 provides higher yield of beans on biennium average evaluated.