LOCALIZED FERTILIZATION INCREASES CROP YIELD AND THE SIZE OF AVOCADO FRUITS

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Dr. Samuel Salazar-García[1] and Dr. Ignacio Lazcano-Ferrat[2]

[1] INIFAP. Campo Experimental Santiago Ixcuintla c.p. 63300 A.P. 100. Santiago Ixcuintla , Nayarit, México.

[2] INPOFOS. Ignacio Pérez Sur # 28-216, Col. Centro c.p. 76000 Querétaro, Qro., México.

This Project was initiated in 1998, with the main goal of increasing crop yield by means of localized fertilization. This study was performed in a commercial orchard of three hectares, with 14 year-old avocado trees of the "Hass" variety. This orchard was located in V. Carranza, Tepic, Nayarit (N 21º32.04', W 104º 59.08'), at 927 masl. Trees were planted at a distance of 8 x 8 m (156 trees per hectare) and cultivated under rainfed conditions. The trees received the standard management used by the growers except that fertilization was modified in the present study. Nutrient analysis in leaves showed low levels of potassium (K) and sulfur (S); although near the minimum, the levels of nitrogen and zinc were considered normal, and the level of boron was found below the values considered optimal. The soil had a sandy-loam texture with a cationic exchange capacity of 6.7 meq/100g, pH 5.8, P content was 8 ppm, K_i content 370 ppm, a percentage of organic matter of 2.9 % , average levels of Mg, S-SO_4, B and Cu, low levels of Ca and Fe, and very low levels of Mn and Zn. The fertilization program used (shown in Table 1) was designed according to all the previous studies. Fertilization was applied during the summer months of 1998, 40 cm in deep and in a radium of 2 meters around every tree.

Table 1. Fertilization program used from 1996 to 2001.

Fertilizers used	Dose (kg/T)	Fertilizers used	Dose (kg/T)	Fertilizers used	Dose (kg/T)
1996		*1999*		TSP* (46 % P_2O_5)	1.0
T-17(N-P_2O_5-K_2O)	3.0	SA (21% N)	3.4	K_2SO_4 (50% K_2O)	4.8
1997		TSP* (46 % P_2O_5)	4.2	S. zinc (35.5% Zn)	1.0
T-17(N-P_2O_5-K_2O)	4.0	K_2SO_4 (50% K_2O)	2.8	Boron (11 % de B)	0.2
1998		Cal (40 % CaO)	1.0	*2001*	
SA (21% N)	3.4	Boron (11% B)	0.2	SA (21% N)	8.3
TSP* (46 % P_2O_5)	4.2	*2000*		K_2SO_4 (50% K_2O)	3.5
K_2SO_4 (50% K_2O)	2.8	SA (21% N)	8.6	K_2SO_4(50% K_2O)	1.0
				Boron (11% B)	0.2

During the three years previous to the application of the fertilization program, crop yields ranged between 8 and 10 ton per hectare (ton/ha). A sharp increment was observed in 1999, where the production was higher than 32 ton/ha. The following years showed yields ranging between 25 and 27 ton/ha, being the average production 28.4 ton/ha for the set of years included between 1999 and 2002. The size of the fruits also increased as result of the fertilization treatment: sizes in the range of 177 to >266 g, considered big, corresponded to 27.5% of the fruits during the two years previous to the beginning of the program. However one year later, 1999, the ratio of fruits in this range was almost twice, reaching 50%. This increment in size was maintained during the following years, reaching 72% in 2002.