Alterations in postharvest quality of industrial tomato fertilized with NPK doses

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INTRODUÇÃO

The industrial tomato is of high nutritional demand, mainly of nitrogen (N), phosphorus (P) and potassium (K), which are between the most demanded by culture (Araújo et al., 2018; Popescu and Dinu, 2019). Due the advances on the industrial chain, many companies are motivated to launch of new cultivars, more productive and with elevated post-harvest quality, seeking good performance in the industry to obtaining high quality by-products. (Almanza-Merchán et al., 2016).

Due the high responsiveness of tomatoes destined to processing, high fertilization is observed in production fields, generating nutritional imbalance that can reflect in productive and quality losses of tomato fruits, culminating in a low sustainability agriculture (Moura and Golynski, 2018).

OBJETIVO

This study evaluated the agronomic yield and postharvest quality of industrial tomato fertilized with N, P and K rates. The study was conducted with the hybrid 'Heinz 1421'.

MATERIAL E MÉTODOS

The study was developed with the industrial tomato 'Heinz 1421' on Tomateiros farm, belonging to company BESTPULP Brasil Ltda. The agricultural area is located on Perímetro Irrigado do Jaíba, in Jaíba, Minas gerais, Brazil.

The experimental design was a randomized complete block design with three replications in a 4 x 4 x 4 factorial scheme. The treatments consisted of four doses of N (35, 105, 175 and 245 kg ha^{-1} of N), of P (100, 300, 500 and 700 kg ha^{-1} of P_2O_5) and K (37.5, 112.5, 187.5 and 265.5 kg ha^{-1} of K_2O). Such formulation was based on the dose of 140 kg ha^{-1} N, 400 kg ha^{-1} P_2O_5 e 150 kg ha^{-1} K_2O, using 25, 75, 125 and 175% of the dose of each nutrient to treatments composition.

Experimental units (plots) was developed by three double lines of plants, 3 m length, 1,26 m between double lines and 0,5 m between lines in the double lines, with 33000 plants per hectare. Useful area was composed of the central double line with the lines extremity considered as border, keeping 1 m between plots.

At the end of the cycle, 102 days after transplant, plants of useful area were harvest, determining the fruits maturation percentage (MF) and separating 2 kg of fruits from each plot to characteristics evaluation: soluble solids (SS), expressed in ºBrix; hydrogen potential (pH); titratable acidity (AT), expressed in meq kg^{-1} of citric acid; relation between soluble solids and the acidity (SS/AT) and fruits firmness (FIRM), expressed in Newtons (AOAC, 2005). The industrial pulp yield was defined by:

$$\text{RIP (ton ha}^{-1}\text{ of pulp)} = \frac{\left(\text{PT (ton ha}^{-1}\text{)} \times 0{,}95\right) \times \text{°SS of fruits}}{28}$$

The variables Were submitted to multiple regression for models adjust of regression, which express the biological factor in question and that were significant to the effects of N, P and K. To model adjust, was utilized the "Stepwise Backward" method and predefined the significance of 95% by t of *Student* test for permanence of regression coefficients.

RESULTADOS E DISCUSSÃO

Table 1. Postharvest quality of 'Heinz 1421' industrial tomato fruits in function of fertilization with N, P and K doses. UNIMONTES, 2019.

Variable	Equation	P_{value}	N	P_2O_5	K_2O	Y_{MAX}
Soluble Solids	$\hat{y} = 4{,}86$	0,8763	ns	ns	ns	4,86
Fruit Maturation	$\hat{y} = 83{,}9963 - 0{,}0001821^{**} N^2 + 0{,}0001387^{**} NK$	0,0001	101	ns	265,5	85,9
Hydrogen Potential	$\hat{y} = 4{,}1836 - 0{,}0002512^{**} N - 0{,}00004146^{**} P$	0,0001	35	100	ns	4,17
Titratable Acidity	$\hat{y} = 0{,}4016 + 0{,}0002083^{*} N$	0,0001	245	ns	ns	0,45
Soluble Solids / Titratable Acidity	$\hat{y} = 11{,}36$	0,1265	ns	ns	ns	11,36
Firmness	$\hat{y} = 25{,}32$	0,5739	ns	ns	ns	25,32

*, ** - Significative coefficient in 5 and 1% by t of *Student* test. ns - There was no dose effect for the analyzed variable.

Table 2. Industrial pulp yield in function of the postharvest quality variables of 'Heinz 1421' industrial tomato fruit fertilized with N, P and K doses. UNIMONTES, 2019.

Variable	Equation	P_{value}	Maximum		
			MF	SS	REND
REND	$\hat{y} = 9{,}4210 + 0{,}0937^{**} MF + 3{,}1565^{**} SS$	0,0001	85,9	4,86	20,63

*, ** - Significative coefficient in 5 and 1% by t of *Student* test. MF – Fruits maturation (%), SS – Soluble solids (°Brix), REND – Industrial pulp yield (ton ha^{-1}).

CONCLUSÕES

Fertilization with 35 kg ha^{-1} of N, 700 kg ha^{-1} of P_2O_5 and 187.5 kg ha^{-1} of K_2O yielded the best results for the agronomic yield components of tomato Heinz 1421.

And the doses of N, P and K do not change the soluble solids content, the relationship between soluble solids and acidity and the firmness of the fruits.

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