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YIELD AND QUALITY OF PASSION FRUIT UNDER ORGANIC CULTIVATION WITH INPUT LEVELS AND IRRIGATION IN THE STATE OF ACRE[1]

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ABSTRACT - The use of organic fertilizers can improve the chemical, physical, and biological properties of the soil, with their use implying low environmental impact. This study aimed to evaluate the yield and quality of yellow passion fruit grown in an organic system associated with irrigation and input levels. A randomized complete block design in a 3x2 factorial arrangement with four replications was adopted. The factors evaluated were: three input levels (fertilizers and alternative pesticides) and the presence or absence of irrigation. Fertilization consisted of the application of 5, 10, and 15 liters of organic compost per plant and 500, 1,000, and 1,500 g of lime per plant, corresponding to input levels 1, 2, and 3, respectively. Topdressing fertilization was split into two applications, corresponding to 118, 235, and 353 g per plant of thermophosphate and 59.1, 118.20, and 176.40 g per plant of potassium sulfate for levels 1, 2, and 3 of input application, respectively. The alternative pesticides were sprayed every 30, 15, and 7 days for levels 1, 2, and 3, respectively. The number of fruits per plant and the yield increased using the input level 3 associated with irrigation. In the absence of irrigation, input levels 2 and 3 increased the content of soluble solids. The titratable acidity, TSS/TTA ratio, and the fruits classified as extra did not differ significantly between treatments. Input levels 1 and 2 associated with the absence of irrigation increased the percentage of fruits classified as commercial.

Keywords: Organic fertilization. Agroecology. Fruit growing. *Passiflora edulis*.

PRODUTIVIDADE E QUALIDADE DE MARACUJÁ EM CULTIVO ORGANICO COMBINADO COM NIVEIS DE INSUMOS E IRRIGAÇÃO

RESUMO - A utilização de fertilizantes orgânicos pode contribuir para melhoria das propriedades químicas, físicas e biológicas do solo, com seu uso apresentando baixo impacto ambiental. O objetivo deste trabalho foi avaliar a produtividade e a qualidade do maracujá amarelo em sistema orgânico, combinado com irrigação e níveis de insumos. Utilizou-se delineamento experimental em blocos casualizados, disposto em esquema fatorial (3x2) com quatro repetições. Os fatores avaliados foram: três níveis de insumos (fertilizantes e defensivos alternativos), com presença e ausência de irrigação. A adubação constou da aplicação no plantio em: 5, 10 e 15 litros de composto por planta e 500, 1.000 e 1.500 g de calcário por planta, para os níveis de insumos 1, 2 e 3, respectivamente. A adubação de cobertura foi parcelada em duas vezes: 118, 235 e 353 g por planta de termofosfato e 59,1, 118,20 e 176,40 g por planta de sulfato de potássio, para os níveis 1, 2 e 3 de aplicação de insumos, respectivamente. Os defensivos alternativos foram pulverizados a cada 30, 15 e 7 dias para os níveis 1, 2 e 3, respectivamente. O número de frutos por planta e a produtividade aumentaram utilizando o nível 3 de insumo aliado à irrigação. O nível 2 e 3 de insumos, na ausência de irrigação aumentaram o teor de sólidos solúveis. A acidez titulável, *ratio* e frutos classificados como extra não diferiram significativamente entre os tratamentos estudados. Utilizando insumos nos níveis 1 e 2 e na ausência de irrigação, aumentou a porcentagem de frutos classificados como orgânicos.

Palavras-chave: Adubação orgânica. Agroecologia. Fruticultura. *Passiflora edulis*.

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INTRODUCTION

Yellow passion fruit (*Passiflora edulis* Sims) is originally from the American continent and is grown in countries with tropical and subtropical climates. Brazil is the leading producer of this fruit in the world, which is cultivated mainly in the Northeast, Southeast, and North regions of the country. Brazilian production in 2019 reached 59,3429,000 kg, with an average yield of 14,271 kg ha^{-1}. In the state of Acre, production reached 1,096,000 kg, with an average yield of 8,768 kg ha^{-1}, well below the national average (IBGE, 2019).

Despite the consolidation of Brazilian passion fruit production, the average yield is still below the full potential of this crop, which can reach up to 68,790 kg ha^{-1} (CARVALHO et al., 2010). Among the several limitations that may prevent the increase in yield, nutrient and water availability, and losses due to phytosanitary problems are highlighted. Nutrient deficiency decreases plant vigor, limiting root and shoot production, flowering, and causing external deformations in fruits, among other problems (FREITAS et al., 2011a).

Nutrient supply and phytosanitary treatments are necessary to obtain satisfactory yields and high commercial quality fruit (PACHECO et al., 2017). However, in conventional cultivation, chemical fertilizers and pesticides represent major production costs (PACHECO et al., 2017). The use of organic fertilizers not only contributes to improving the chemical properties of the soil but also its physical and biological properties, consequently reducing production costs (ARAÚJO NETO et al., 2014a).

Ecological management is proposed as an alternative to conventional management, resulting in the rehabilitation and balance of ecosystems (LEIJSTER et al., 2019). Organic agriculture consists of a production system that largely excludes the use of high-concentration and high-solubility fertilizers and synthetic pesticides, replacing them with natural pesticides and fertilizers, making greater use of organic waste, and minimizing the dependence on external inputs (ARAÚJO NETO; FERREIRA, 2019; FINATTO; CORRÊA, 2010).

In addition to fertilization, irrigation is responsible for increasing passion fruit yield. Cultivation under favorable water conditions for both soil and plant allows higher gas exchange between plants and environment, avoiding water stress and providing better photosynthetic efficiency, positively influencing fruit yield and quality. Depending on the duration of water deficit, some damages may be irreversible (GOMES et al., 2012; FREIRE et al., 2014), as observed for yellow passion fruit under organic cultivation, resulting in zero yield in the main (second) growing season (GALVÃO et al., 2020).

In the state of Acre, the dry, low-rainfall period extends from June to August. Given this scenario, irrigation becomes essential for the development of cultivated plants in order to extend fruiting, improve fruit quality, and ensure production in the off-season when passion fruit reaches its highest price (ARAÚJO et al., 2013).

This study aimed to evaluate the yield and quality of yellow passion fruit grown in an organic system, associated with the presence and absence of irrigation and input levels.

MATERIAL AND METHODS

The experiment was conducted at the Seridó Ecological Site, located in the Aquiry Settlement Project, Highway AC 10, Km 4, branch José Rui Lino, Rio Branco, state of Acre, Brazil, at the coordinates 09º53'16 "S and 67º49'11"W, with an elevation of 170 m above sea level.

According to the Köppen classification, the climate of the region is type *Am* (warm and humid), with an average annual temperature around 23.3 ºC, relative air humidity of 72%, and annual precipitation ranging from 2,079.9 mm to 2,244.5 mm during the experimental period (Figure 1) (INMET, 2019).

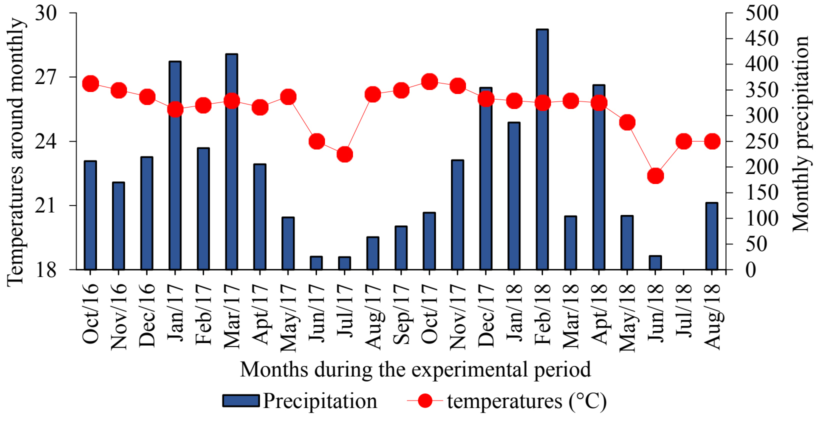

Figure 1. Temperature and precipitation data throughout the experimental period. Rio Branco, Acre, Brazil. Source: INMET, 2019

The soil of the experimental area is classified as a YELLOW ARGISSOL, located in an area of gently undulating topography with no apparent erosion and moderate drainage. The chemical attributes of the 0-20 cm depth layer are as follows: pH = 5.2; P = 1.7 mg dm^{-3}; K = 1.8 mmolc dm^{-3}; Ca = 28 mmolc dm^{-3}; Mg = 12 mmolc dm^{-3}; Al+H = 72 mmolc dm^{-3}; M.O. = 17 g dm^{-3}; SB = 41.4%; CEC = 113.4 mmolc dm^{-3}; V = 36.5%.

The experiment was conducted from November 2016 to August 2018. The experimental design was in randomized blocks, in a 3x2 factorial arrangement with four replications. The factors evaluated were three input levels (alternative fertilizers and pesticides) and the presence and absence of irrigation. The experimental unit consisted of four passion fruit plants planted at a 3 x 3 m spacing. The plants were conducted in a vertical shoot positioning system.

The passion fruit cultivar used was a public domain F3 synthetic variety consisting of the genotypes identified as 2, 22, 23, 35, 37, 33, and 20, originated from Viçosa (Minas Gerais, Brazil), from the State University of Northern Rio de Janeiro (UENF, Campos dos Goytacazes, Rio de Janeiro, Brazil), and from the municipalities of Brasiléia and Rio Branco, Acre, Brazil.

The seedlings were produced in August 2016 in trays filled with organic substrate. After reaching 2 to 3 cm in height, with two definitive leaves, the seedlings were individually transplanted into 26 cm x 9 cm x 6 cm plastic bags containing 1.5 L of organic substrate and kept in a greenhouse, receiving daily irrigation.

Soil preparation was performed using a motorized brush cutter to remove the spontaneous vegetation. After the natural drying of the straw, planting holes measuring 40 cm x 40 cm x 40 cm were opened, subsequently proceeding with the application of the input levels. Fertilization consisted of the application of 5, 10, and 15 liters of compost, and 500, 1,000 and 1,500 g of lime per planting hole, corresponding to input levels 1, 2, and 3, respectively.

The organic compost was produced from signalgrass (*Urochloa* sp.) and naturally decomposed spontaneous plants available on the property, with the chemical analysis resulting as follows: N = 1.13%; P = 1.33%; K = 0.18%; Ca = 3.36%; Mg = 0.20%; S = 0.10%; pH = 6.55; organic matter = 11.97%; ash = 88.61%; density (kg m^{-3}) = 350; and C/N ratio = 6.11. Both compost and lime were mixed with soil and returned to the planting holes without inverting the soil layers.

Topdressing fertilization was performed based on the nutrient content revealed by soil analysis and according to the yield estimates in order to achieve 5, 10, and 15 t ha^{-1} through the application of 118, 235, and 353 g of thermophosphate per plant and 59.1, 118.20, and 176.40 g of potassium sulfate per plant, corresponding to input levels 1, 2, and 3, respectively. Fertilization was split into two applications in the first year of cultivation, at 60 and 120 days after planting. In the second year, fertilization was provided in October 2017 and in January 2018.

The drip irrigation system was installed along planting rows, with one sprinkler per plant at a flow rate of 67.5 L h^{-1}. The irrigation demand was established based on the soil matric potential, measured with tensiometers installed at 0.15 m from the plant and 0.20 m depth within the soil. When the value reached 60 kPa, it indicated the water supply moment for the crop, using a gross water depth of 27.63 mm (CARVALHO et al., 2010). Readings were made daily using a puncture tensiometer (digital needle tensiometer). The irrigation time varied according to the initial soil moisture and the infiltration time until moisture saturation was within the field capacity when the tensiometer reading resulted in less than 60 kPa. All crop management practices were performed according to the ecological management of the system, as recommended by Araújo Neto and Ferreira (2019), Silva et al. (2019), and Uchôa et al. (2018), as well as by MAPA normative instructions No. 46, of 2011, and No. 17, of 2014 (BRASIL, 2011 and 2014).

The Bordeaux and lime sulfur mixtures were used to protect the plants against pathogens and pests. These mixtures were used only in the second year of cultivation, whenever necessary, being sprayed according to the respective input level: level 1 every 30 days, level 2 every 15 days, and level 3 on a weekly basis.

The control of spontaneous plants was performed by manual hoeing within a 0.50 cm radius around the plants, using a motorized backpack brush cutter for cleaning within and between rows. Flower pollination occurred naturally by the action of carpenter bees, pollinating insects of the genus *Xylocopa*.

On harvest days, all fallen fruits and those still adhered to the plant were collected, and the indicator of maturation was the peel color more than 30% yellow.

The variables analyzed were: average number of fruits per plant, corresponding to the number of all fruits in the plot divided by the number of plants in each plot (experimental unit); average fruit mass, measured with an electronic balance and obtained by the ratio between the total mass and the number of fruits harvested in the same plot; estimated yield, determined as the product of the average fruit mass, the number of fruits per plant, and the final plant stand distributed in one hectare, with values expressed in kg ha^{-1}. The number of fruits per plant, average fruit mass, and yield were estimated for seasons 1 (March to August 2017) and 2 (September 2017 to August 2018). The seasonality of production was assessed by the monthly yield trend curve of each treatment throughout the production period and expressed as kg ha^{-1} $month^{-1}$.

The content of total soluble solids (TSS) was measured with a digital refractometer with automatic temperature control, and the results were expressed in ºBrix (AOAC, 2012). Total titratable acidity (TTA) was measured by titrating 1 mL of passion fruit juice diluted in 49 mL of distilled water with 0.1 N sodium hydroxide (NaOH), using 1% phenolphthalein as an indicator, with values expressed as percentage of citric acid (%) (AOAC, 2012). The TSS/TTA ratio corresponds to the ratio between TSS and TTA. The sampling for these quality indicators comprised ten ripe fruits per plot.

Fruit classification was performed at harvest by evaluating 30 randomly selected fruits from each experimental plot. The external appearance of the fruits was analyzed based on the criteria of the Brazilian program for the improvement of commercial standards and packaging for horticultural products (BRASIL, 2000) (Table 1).

Most fruits showed some form of deformity in the epidermis, although with a fully preserved interior, being classified into category III according to the conventional classification, meaning fruits with little use. Due to the peculiarities of organic foods, which generally present only aesthetic defects, not relying on a classification of their own, the "organic" category was idealized. As a result, the fruits were divided into two categories: Extra – or fruits with a maximum of 5% of slight damage; and Organic - fruits with up to 100% of slight damage (with a fully preserved endocarp), not admitting serious defects (Table 1).

This logic follows one of the principles of organic agriculture, which relies on valuing internal quality and the absence of toxic residues in food (ARAÚJO NETO; FERREIRA, 2019).

The fruit equatorial diameter (mm) was used to classify the fruits according to their size class (1 to 5) (Table 2).

Table 1. Fruit category according to the occurrence of serious and slight defects in passion fruits.

Defects	Category				
	Extra	I	II	III	Organic
Unripe	0%	2%	3%	20%	0%
Deep damage	0%	1%	3%	20%	0%
Rot	0%	1%	3%	8%	0%
Total serious defects	0%	3%	7%	100%	0%
Total slight defects	5%	10%	25%	100%	100%
General total	5%	10%	25%	100%	100%

Source: (BRASIL, 2000) with adaptations.

Table 2. Classes of fruit equatorial diameter (mm) for passion fruit.

Class (caliber)	Equatorial Diameter (mm)
1	Equal to or less than 55
2	Equal to or greater than 55 until 65
3	Equal to or greater than 65 until 75
4	Equal to or greater than 75 until 85
5	Greater than 85

Source: (BRASIL, 2000).

Data variance analysis was preceded by the detection of outliers by Grubbs's test, normality of errors by the Shapiro-Wilk test, and variance homogeneity by Bartlett's test. Subsequently, the analysis of variance (ANOVA) was performed by the F-test, followed by the comparison of means using Tukey's test ($p < 0.05$). In the case of significant interactions between two factors, the analysis of variance was performed considering the effect of one factor within the levels of the other. Orthogonal contrast calculation was performed by comparing the means of some variables to analyze the effect of the groups in the experiment.

RESULTS AND DISCUSSION

The estimated yield, the average number of fruits per plant, and the average fruit mass were not affected ($p > 0.05$) by the input levels applied in the first season. In the second season, the treatments did not affect the average fruit mass or the yield (Table 3).

Table 3. Number of fruits per plant (NFP), average fruit mass (AFM), and yield (PROD) of passion fruit in seasons 1 and 2 under 3 input levels. Rio Branco, Acre, Seridó Ecological Site.

	1ST SEASON			2ND SEASON		
Input	NFP^{ns} (unit)	AFM^{ns} (g)	PROD^{ns} (kg ha^{-1})	NFP* (unit)	AFM^{ns} (g)	PROD^{ns} (kg ha^{-1})
Level 1	4.07	109.96	479.20	67.00 b	118.25	8828.88
Level 2	5.53	99.36	676.97	95.95 ab	110.50	11539.88
Level 3	8.10	111.54	1.082.33	108.88 a	118.50	14495.38
CV (%)	67.64	24.83	68.81	35.41	6.61	37.48

*: Means followed by the same letter do not differ (p> 0.05) by the F-test;
ns: means do not differ (p> 0.05) by the F-test.

In the second season, there was a higher number of fruits per plant when input level 3 was used, possibly because it provided more nutrients and more efficient pest and disease control, allowing the crop to express its productive potential. When fertilized and under favorable climatic conditions, the passion fruit crop shows better vigor, high flowering index, better fruit development, and abundant fruit formation, improving fruit quality and yield (COSTA et al., 2011; FREITAS et al., 2011a).

The increase in the number of fruits provided by the organic inputs (compost, manure, plant biomass) may be related to the decomposition of organic matter, which plays a major role in the soil, improving its structure, aeration, water retention, and nutrient availability, influencing the nutritional balance of the plant (ARAÚJO NETO et al., 2014b; ARAÚJO NETO; FERREIRA, 2019).

The average fruit mass of the second season was 115 g fruit^{-1} (Table 3), below the fresh consumption standards preferred by consumers, who favor fruits with mass above 180 g (FREITAS et al., 2011b).

When separately analyzing irrigation, no significant effect (p> 0.05) was verified on the number of fruits per plant, average fruit mass, and estimated yield in the two seasons (Table 4).

Table 4. Number of fruits per plant (NFP), average fruit mass (AFM), and yield (PROD) of passion fruit in seasons 1 and 2 in the presence and absence of irrigation. Rio Branco, Acre, Seridó Ecological Site.

	1ST SEASON			2ND SEASON		
Irrigation	NFP^{ns} (unit)	AFM^{ns} (g)	PROD^{ns} (kg ha^{-1})	NFP^{ns} (unit)	AFM^{ns} (g)	PROD^{ns} (kg ha^{-1})
Presence	6.71	106.25	857.35	96.83	117.58	12,698.75
Absence	5.09	107.66	634.99	84.08	113.92	10,544.00
CV (%)	67.64	24.83	68.81	35.41	6.61	37.48

ns: means do not differ (p> 0.05) by the F-test.

This result may be related to the environmental conditions, which significantly influence the flowering behavior of passion fruit. The study region has a period with lower temperature, light incidence, and precipitation that coincides with the lowest photoperiod, when passion fruit flowering and fruit formation cease regardless of water availability (Figures 1 and 2), considering that passion fruit is considered a long-day plant.

According to Cavichioli et al. (2006), the reduction of natural light compromises flowering, fruit formation, and yield, being related to the reduction of the photosynthetic rate caused by the decrease of light and temperature.

When analyzing the total yield through orthogonal contrasts, it was verified that the presence of irrigation and the use of high input levels resulted in higher yields (Table 5).

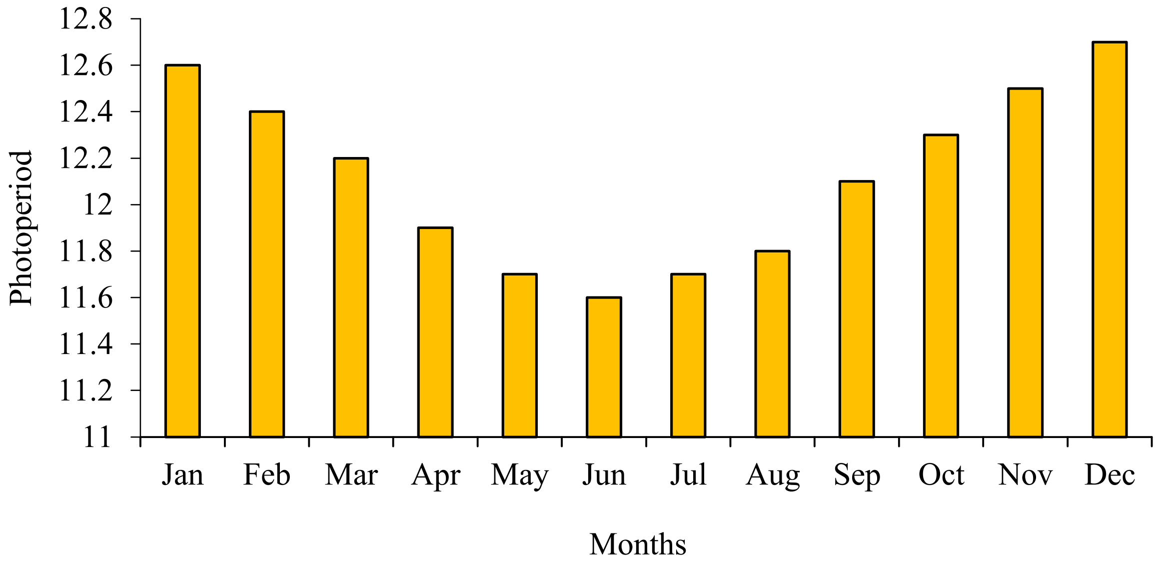

Figure 2. Photoperiod of Rio Branco, Acre.
Source: INMET, 2019.

Table 5. Comparison by orthogonal contrasts between irrigation and input levels on the total yield of yellow passion fruit. Rio Branco, Acre, Seridó Ecological Site.

Orthogonal contrast	Total yield (kg ha^{-1})
No irrigation/level 1	6,945.26 b
Irrigation	13,641.08 a
No irrigation	11,106.37 b
Irrigation/level 3	17,399.21 a
Irrigation/level 1	11,284.59 a
No irrigation	11,106.37 a
No irrigation/level 1	69,4526 a
Irrigation/level 1	11,106.37 a
Irrigation/level 1	11,284.59 a
Irrigation/level 3	17,399.21 a
Irrigation/level 3	17,399.21 a
No irrigation/level 3	13,950.92 a
CV (%)	37.70

Means followed by the same letter do not differ (p> 0.05) by the F-test.

The total yield in the presence of irrigation was 96.41% higher compared to rainfed cultivation associated with input level 1. When comparing non-irrigated cultivation with irrigated cultivation associated with input level 3, this variable was 56.66% higher. These results are above the national average, 14,271 kg ha^{-1}, and above the average of the state of Acre, 8,768 kg ha^{-1} (IBGE, 2019).

Araújo et al. (2012) evaluated the yield of passion fruit irrigated at different times and verified that the treatment with the best response corresponded to the splitting of irrigation into 50% at 7:00 a.m. and 50% at 9:30 p.m., being more efficient than a single application, obtaining an average yield of 16,000 kg ha^{-1}.

Irrigation is essential to meet the crop requirements as cell expansion only occurs when the cell has a certain turgidity. Also, the absence of water directly influences several physiological processes, such as gas exchange, cell elongation, phloem transport, and membrane formation, consequently affecting cell expansion. This decrease in cell expansion results in a smaller leaf area, affecting the production of photosynthetic compounds and their allocation to the fruits, resulting in lower yield (TAIZ; ZEIGER, 2013).

The period with the highest yield occurred from December 2017 to June 2018, with its peak in February and March 2018 (Figure 3), when the long photoperiod coincided with high natural water availability. The low fruit production from September to October 2017 is related to the short photoperiod, while the decrease in production from July to August 2018 is related to plant aging and the short photoperiod. Environmental factors significantly influence the entire crop cycle, from floral bud emergence until fruit ripening. The higher the average temperature, the shorter the passion fruit phenological cycle (SOUZA et al., 2012).

There was a significant interaction between the input levels and the presence and absence of irrigation for the content of total soluble solids (TSS), which ranged from 16.5 to 17.5 ºBrix (Table 6).

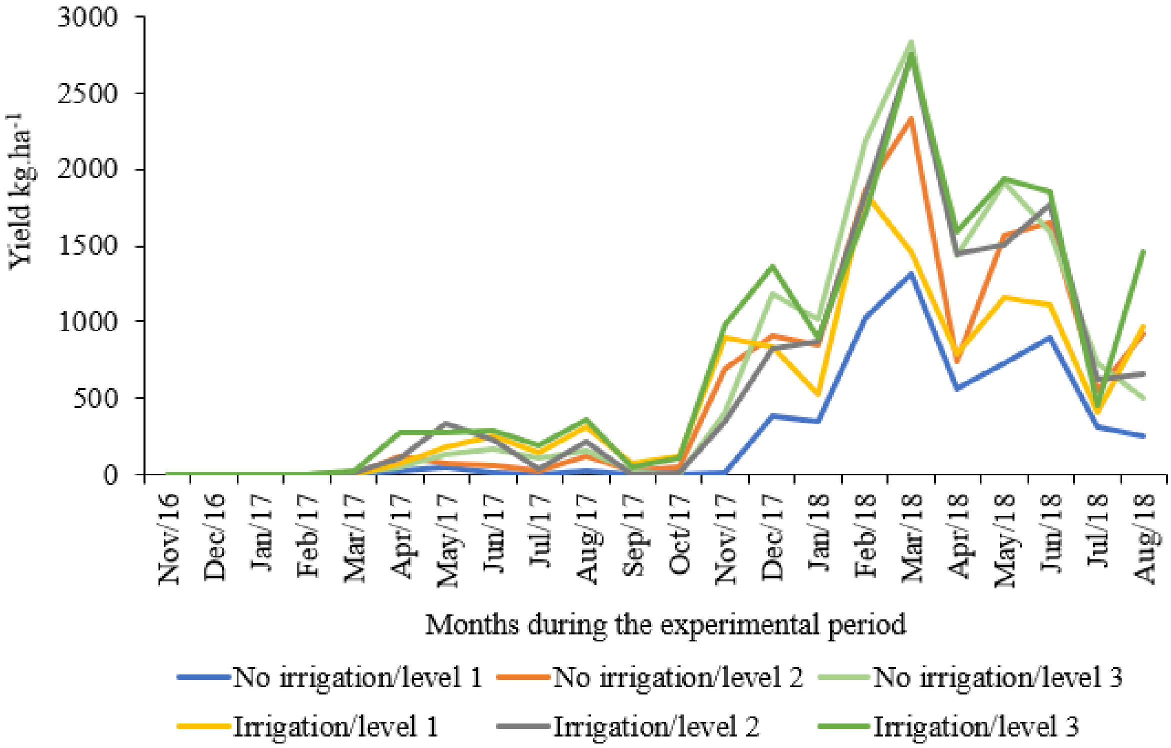

Figure 3. Yield distribution during passion fruit cultivation. Rio Branco, Acre.

Table 6. Total soluble solids (TSS) of passion fruit grown under 3 input levels in the presence and absence of irrigation. Rio Branco, Acre, Seridó Ecological Site.

Irrigation	Input levels		
	Level 1	Level 2	Level 3
Presence	17.50 Aa	16.75 Aa	16.75 Aa
Absence	16.50 Ab	17.25 Aa	17.25 Aa
CV (%)		3.28	

Means followed by the same lowercase letter in the row and uppercase letter in the column do not differ (p> 0.05) by the F-test.

Higher TSS contents were observed in the absence of irrigation associated with increasing input levels. According to the literature, the K supplied via fertilization is reported to play a role in the synthesis of proteins, carbohydrates, sugars, and organic acids, among others, being one of the main nutrients responsible for fruit quality (GANESHAMURTHY; SATISHA; PRAKASH PATIL, 2011).

There was no influence of irrigation on the content of soluble solids. Koetz et al. (2010) reported no difference in the content of soluble solids even under different irrigation levels. This variable increases with fruit maturation, which is the factor that most interferes with this parameter (SANTOS et al., 2013).

The total titratable acidity (TTA) and TSS/ TTA ratio were not influenced by the fertilization levels and the presence or absence of irrigation (Table 7). Acidity is related to the maturation stage and harvest time of the fruit. The TSS/TTA ratio gives an idea of the balance between components (MOURA et al., 2016).

The interaction between input levels and irrigation had a significant effect on the classification of the organic fruit category (Table 8). Associated with low input levels (1 and 2), the absence of irrigation resulted in a higher percentage of fruits within this category.

Table 7. Total titratable acidity (TTA) and TSS/TTA ratio of passion fruit grown under 3 input levels in the presence and absence of irrigation. Rio Branco, Acre, Seridó Ecological Site.

	Input levels^{ns}			Irrigation^{ns}		CV (%)
	Level 1	Level 2	Level 3	Presence	Absence	
TTA (%)	3.88	3.60	3.58	3.76	3.62	8.23
TSS/TTA	4.47	4.73	4.81	4.57	4.78	8.82

ns: means do not differ (p> 0.05) by the F-test.

Table 8. Percentage (%) of organic category fruits grown under 3 input levels in the presence and absence of irrigation. Rio Branco, Acre, Seridó Ecological Site.

Irrigation	Input levels		
	Level 1	Level 2	Level 3
Presence	82.50 Ba	82.50 Ba	89.25 Aa
Absence	96.75 Aa	90.00 Aab	85.50 Ab
CV (%)		5.15	

Means followed by the same lowercase letter in the row and uppercase letter in the column do not differ (p> 0.05) by the F-test.

The external appearance of fresh fruits and vegetables is a primary criterion in decision-making upon purchasing and pricing a product. However, the consumers of organic products value internal quality and the absence of toxic waste even more than the external appearance (ARAÚJO NETO; FERREIRA, 2019).

Most of these defects are due to the presence of superficial damage, healed injuries, deformation, wrinkling, and the presence of stains (BRASIL, 2000). These defects can be categorized according to their origin into the following classes: environmental factors, physiological factors, biological factors, genetic variation and aberrations, and mechanical damage (ARRUDA et al., 2011).

According to Chaboussou (1987), the enrichment of plant tissues with soluble substances impairs the proper performance of proteosynthesis and proteolysis, increasing the amount of still soluble amino acids, sugars, and minerals, and making leaves and fruits more attractive to pests and pathogenic microorganisms, consequently resulting in increased injuries (defects), damaging fruit appearance.

The use of lower input levels also implies a less frequent use of alternative pesticides, causing greater fruit damage in these treatments.

The classification of Extra category fruits and the size were not significantly affected by the input levels and irrigation (Table 9).

Table 9. Percentage (%) of Extra category fruits and percentage (%) of different diameter classes of passion fruit grown under 3 input levels and in the presence and absence of irrigation. Rio Branco, Acre, Seridó Ecological Site.

	Input levels^{ns}			Irrigation^{ns}		CV (%)
	Level 1	Level 2	Level 3	Presence	Absence	
Extra category (%)	31.25	35.75	34.00	28.00	39.33	42.13
D1 (mm)	4.88	5.75	4.88	4.92	3.25	128.43
D2 (mm)	17.75	19.75	14.63	20.25	14.50	68.10
D3 (mm)	36.63	28.63	34.13	31.25	35.00	54.80
D4 (mm)	18.88	26.13	28.25	19.92	28.92	35.50
D5 (mm)	21.63	19.63	21.38	23.42	18.33	68.45

^{ns}: means do not differ ($p > 0.05$) by the F-test.

On average, 33.67% of fruits fell into the Extra category, while 53% showed slight damages characterized by the presence of superficial damage, healed injuries, deformations, wrinkles, and the presence of stains (BRASIL, 2000). Pacheco et al. (2016) observed that the percentage of defects verified is not due to the use of organic fertilizers.

Regarding size, most of the fruits analyzed belong to classes 3 and 4 (Table 2). Approximately 60% of passion fruit production is destined for the fresh fruit market, which prefers large and oval fruits, with the rest being used by the industries. Fruits with better size classification provide a higher financial return (R$ kg^{-1}) upon commercialization (ROCHA et al., 2013).

CONCLUSIONS

The use of higher input levels associated with irrigation increases the estimated yield.

The number of fruits per plant increases with the use of input levels in the second season.

The content of soluble solids in the pulp increases with the association of higher input levels (2 and 3) and the absence of irrigation.

Acidity, TSS/TTA ratio, and the percentage of Extra category fruits are not affected by the input levels and irrigation.

The percentage of organic fruits is increased in rainfed cultivation associated with low input levels (1 and 2).

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