PLANTS POPULATION AND GROWTH REGULATOR EFFECT AT THE UPLAND RICE CROP INDUSTRIAL QUALITY

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Palavras-chave: *Oriza sativa*, filling, irrigation,

INTRODUCTION

The rice crop is one of the most important because it's basic food human in very countries around of the world, besides, this crop have an great economic importance and is distributed in tropical, subtropical and temperate climates. The rice is sowed some systems as upland, flooded and with sprinkler irrigation. Because of this geographic distribution, are found differences at the evapotranspiration, Tabbal et al. (2002) found values evapotranspiration values at the tropics of 4 a 5 mm day^{-1} at the rain season and 6 a 7 mm dia^{-1} at the dry season. In the other hand, in a temperate conditions, Magalhães Júnior et al. (2006) looked daily values of 6,7 e 7,7 mm day^{-1}.

The benefit of canopy distribution looking the best intercept the solar irradiation and water use without increase of water and nutrient stress are important to agricultural yield, however the research didn't show a positive correlation between the increase of plant population and yield (WESTGATE et al., 1997) in the other hand, some researches have showed a positive correlation between the increase of plant population and yield (ANDRADE et al., 2002). The use of growth regulators and resistant lodging cultivars, the plants populations have influence in yield of rice crop because of water, nutrients and solar energy use efficiency.

According to Crusciol et al. (2003), the upland rice show low yield and grain industrial quality in comparison with flooded rice and this is have relation with water stress. The use of sprinkler irrigation, the rice crop isn't subject to water stress and the grains filling is continue and this have influence in the income benefit, whole grains and broken grains (OLIVEIRA, 1994).

The objective of this research was looked out the plant population and growth regulator effect at the upland rice crop industrial quality, sowed in Selvíria-MS at 2010/2011 harvest.

MATERIAL AND METHODS

The research was carried out at Selvíria, MS, with the follow geographic coordinates, 51º22' W and 20º22' S, with 335 m above the sea. The soil, according to Embrapa (1999) is a distrophic Red-Latosol, the annual average of rain is 1.370 mm, the annual average of temperature is 23,5ºC and the air moisture range since 70 until 80%. After sowing, for soil quimical evaluation, were taken twenty samples in a depth of 0,2m. The soil quimical evaluation show this values: OM. (organic matter), 21 g dm^{-3}; P, 35 mg dm^{-3}; pH ($CaCl_2$), 5,5; K, Ca, Mg and H+Al, 1,7, 21, 11 and 20 mmolc dm^{-3}, in sequence and V% = 63%.

The experimental design was the randomized blocks, in a slip-splot scheme with plant population in the parcels and these were divided in two subplots, one half with and other without the aplication of growth regulator ethyl-trinexapac (Moddus®). The treatments

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were eighteen (nine plants population 60, 90, 120, 150, 180, 210, 240, 270 and 300 able seeds m^{-2}) with and without aplication of plant regulator, randomized distribute in four blocks. There was in each subplot six rice lines with 4,5 m of lenght with 0,35 m row spacements. In each subplot was harvest the two center lines.

For soil surface homogenization and incorporation of dead plants, the soil was plowed and harrowed. After the soil management, was opened grooves throught the soil surface using a cultivator of seven stems. The rice was sowed at 11/19/2010, using the Primavera cultivar, the sowed fertilization was used the Cantarella & Furlani's (1997) recommendations to irrigated rice. Was introduced in sowing lines 180 kg ha^{-1} of 08-28-16 (N-P_2O5-K_2O) + 1% Zn + 3% Ca+ 0,3% S. With the fertilizers and seeds, to plagues control was deposited in the grooves the insecticide carbofurano (Furadan 50 GR®) using the 1000 g ha-1 active ingredient rate, this is the same that 20 kg ha-1 of Furadan 50 GR®, after the grooves was covered. To control of weeds, after the cover of grooves, was applied the herbicide pendimetalina (Herbadox®) at 1250 g ha^{-1} active ingredient rate, this is the same that 2,5 L ha^{-1} of Herbadox®. Because of weeds emergence after sowing was applied the selective herbicide dioxibentazona (Basagran 600®) at 720 g ha^{-1} rate of active ingredient, this is the same that 1,2 L ha^{-1} of Basagran 600®.

The cover nitrogen fertilization was made two times. The first time the nitrogen was applied at the start of tillering and the rate of nitrogen was 70 kg ha^{-1} using the urea (45% de N) as source of this nutrient. The second nitrogen fertilization was at the panicle differentiation applying 30 kg ha^{-1} of N using ammonium sulfate as source. The ethyl-trinexapac application was made on the plants at the 150 g ha^{-1} rate at the panicle differential prime (NASCIMENTO, 2008). After the crop managements was installed a sprinkler irrigation system. To water management was used three crop coefficients (Kc). For vegetative stage adopted 0,4; for initial and final reproductive stage were used 0,7 and 1,0 respectively and at maturation stage the values were change, the initial was 1,0 and the final 0,7. To get the reference evapotranspiration (ETo), was used the Class A evaporation multiplied with the pan coefficient – Kp. The crop evapotranspiration was estimated throught the equation 1.

$$\text{ETc (mm day}^{-1}\text{)} = \text{ETo x Kp x Kc} \qquad (1)$$

After the harvest, for evaluation of industrial quality of upland rice crop, was collected a sample of 100 g of rice husk in each subplot, which was processed in the mill race by 1 minute. Then, the polished grains (polished) were weighed and the value was considered as income benefit, and the results expressed in percentages. After, the polished grains (polished) were placed in Trieur "nº.2 and the separation of grain was processed for 30 seconds. The grains that remained in "trieur" were getting the heavy whole grain and broken grain, both expressed in percentage.

R RESULTS AND DISCUSSION

The income benefit, heavy whole and broken grains percentages are descript in the Table 1.

To income benefit, there wasn't growth regulator and plant population significative effect, however the interaction growth regulator x plant population was significative. The results with regulator were adjust in a quadratic regression (Y = -0.00005x2 +0.0034x + 62.28; R^2 = 0.44) and the (Y= -0.00005x^2 – 0.0084x + 68.6; R^2 = 0.15) for results without regulator. These results are similar with Oliveira (1994) and Crusciol (1998) to sprinkler irrigation.

The whole grains percentage was influenced by plants population. There was a linear adjust of results (Y = -0.244x + 87.41; R^2 = 0.78). Crusciol et al. (2003) looked similar values with sprinkler irrigation and these authors have found the best the best values with sprinkler irrigation at Selvíria-MS.

The broken grains percentage was influenced by plants population and the results adjusted in a linear regression ($Y = 0.0244x + 12.57$; $R^2 = 0.78$). Crusciol et al. (2003) didn't look significative difference comparing the irrigation managements and the control treatment.

Table 1. Income benefit, whole grains and broken grains average accordig to growth regulator and plant population of upland rice. Selvíria-MS, 2011.

Treatments		Income benefit	Whole grains	Broken grains
RC	CR	67.82 a	83.05 a	16,94 a
	SR	68.01 a	82.98 a	17,01 a
DS	60	68.44 [1,2]	85.69 [3]	14,30 [4]
	90	67.97	86.27	13,72
	120	67.87	84.62	15,37
	150	68.39	83.40	16,59
	180	68.03	82.97	17,02
	210	67.69	80.29	19,70
	240	67.47	81.45	18,54
	270	67.98	82.63	17,36
	300	67.40	79.78	20,21
Teste F	RC	0.97^{ns}	0.01^{ns}	$0{,}01^{ns}$
	DS	1.46^{ns}	5.02**	5,02**
	RC x DS	3.40**	0.83^{ns}	$0{,}83^{ns}$
	REG.	ns	26.02**	26,02**
CV[1]	%	1.18	5.18	25,33
CV[2]	%	1.24	3.44	16,84

Averages followed of the same letter in columns aren't statistically different among them by tukey test of 1 and 5% of probably. ns – Without significance and **,* significative at 1% e 5% of probably by F test, respectively. CR: With aplication of growth regulator. SR: With aplication of growth regulator. RC: growth regulator. DS: Plants population. CV(1) – Variation coefficient for plants population. CV(2) – Variation coefficient for growth regulator. (1) $Y = -0.00005x^2 +0.0034x + 62.28$; $R^2 = 0.44$. (2) $Y= -0.00005x^2 – 0.0084x + 68.6$; $R^2 = 0.15$. (3) $Y = -0.244x + 87.41$; $R^2 = 0.78$. (4) $Y = 0.0244x + 12.57$; $R^2 = 0.78$.

CONCLUSION

In this research, the growth regulator didn't influenced the income benefit, number of broken and whole grains;

The income benefit and the number of broken and whole grains were affected by plants population;

There wasn't interaction among the treatments.

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