Available online at http://www.journalijdr.com

IJDR

ISSN: 2230-9926

International Journal of Development Research
Vol. 11, Issue, 10, pp. 50647-50651, October, 2021
https://doi.org/10.37118/ijdr.22788.10.2021

RESEARCH ARTICLE OPEN ACCESS

USE OF DIFFERENT DOSES OF DINAMIC: A RESEARCH STUDY

*Giovani Amaral Pistolato, Lauro Sergio Brandolezi Junior, Wellington Antonio Baroni and Luciana Teixeira De Paula

University Center North Paulista (Unorp), Agronomy School - Sao Jose do Rio Preto – SP, Brazil

ARTICLE INFO

Article History:
Received 10th July, 2021
Received in revised form
14th August, 2021
Accepted 16th September, 2021
Published online 23rd October, 2021

Key Words:
Sugarcane, Herbicides, Dinamic, Amicarbazone, Dose.

***Corresponding author:**
Giovani Amaral Pistolato

ABSTRACT

Introduction: In the sugarcane production scenario, Brazil stands out as the world's largest producer. In this context, straw is the most recent co-product of the crop, and its accumulation in the field was triggered by the change in the harvesting method. In raw cane areas, drastic reductions in the incidence of grass weeds and high infestations with *Ipomoea spp* and *Euphorbia heterophylla* are observed. In this regard, Among the herbicides registered for the cultivation of sugarcane, with potential for use in raw cane, amicarbazone is registered in Brazil under the trade name of Dinamic. **Objective:** To evaluate the effect of different doses of Dinamic on sugarcane production. **Materials and Methods:** Area Information, Biometric Methodology, Monthly Rainfall in the Experiment Period, Monitoring Image, Soil Classification. Variables were presented in percentage, mean and standard deviation format. Depending on the Gaussian distribution (Normality test), comparisons of variables were performed using the One-Way ANOVA Test (Tukey) between the variables in the present study, considering $p<0.05$ with statistical significance. **Results and conclusion:** The treatments showed no statistically significant difference ($p<0.05$; Tukey 5%) in tonne of cane per hectare and internodes in both farms. Still, the diameter of farm 63728 did not show a statistical difference, however, in farm 63010 the diameter and tillers/m showed a statistically significant difference ($p<0.05$), with the best dose being 0.8 (2x) and 1.2/ 1.6 respectively. For height, the treatments showed a statistically significant difference ($p<0.05$; Tukey 5%), with Dinamic at 1.4 kg/ha being the best dose for this variable on farm 63728, and the best dose for farm 63010 was 2.0 kg/ha, and in both farms, the doses were higher than Dinamic.

Citation: ***Giovani Amaral Pistolato, Lauro Sergio Brandolezi Junior, Wellington Antonio Baroni, Luciana Teixeira De Paula.*** "Use of different doses of dinamic: a research study*", International Journal of Development Research*, 11, (10), 50647-50651.

INTRODUCTION

In the scenario of sugarcane production, Brazil stands out as the world's largest producer (Negrisoli, 2007). The tendency of the sugar-alcohol industry is of great growth in the coming years due to the worldwide need to use renewable sources of energy and industrial raw materials. In this sense, the sugarcane agroindustry has demonstrated, in recent decades, a great capacity to add value to co-products of alcohol and sugar, such as vinasse, filter cake, and bagasse (Kaur, 2013; Singh, 2020). In this context, straw is the most recent co-product of the crop, and its accumulation in the field was triggered by the change in the harvesting method. The mechanized harvesting of sugarcane without burning the straw gave rise to a new production system called raw sugarcane. The raw cane system is already used in approximately 35% of the sugarcane fields in the State of Sao Paulo and, in smaller percentages, in other producing regions (Negrisoli *et al.*, 2007; Toledo, 2007).

The bases for the use of straw for energy production or industrial purposes are still being created. In the vast majority of areas with mechanized harvesting without prior burning of the straw, this residue is not yet used for industrial purposes, remaining in the field. Even when collected and used for energy generation, the removal of straw from the field is not total, with smaller quantities remaining in the field (Toledo, 2009). Thus, harvesting without burning leaves a thick layer of straw on the ground that can exceed 20 t ha-1. The presence of straw, in different amounts, has important impacts on weed management. This aspect is relevant because the weeds present in sugarcane production areas can reduce the quantity and quality of the harvested product, reduce the number of viable cuts, in addition to increasing production costs (Negrisoli, 2007). In this sense, in areas of raw cane, drastic reductions in the incidence of grass weeds and high infestations with *Ipomoea spp* and *Euphorbia heterophylla* are observed (Perim, 2009). Late infestations of *Ipomoea spp* are noteworthy, as they can harm or even make impossible the mechanized harvesting of the crop (Yu, 2015).

In this regard, among the herbicides registered for the cultivation of sugarcane, with potential for use in raw cane, amicarbazone is registered in Brazil under the trade name Dinamic, for the control of mono- and dicotyledonous weeds (Agrianual, 2004). In this context, Dinamic is presented in the formulation of water-dispersible granules, at a concentration of 700 g of active ingredient for each 1 kg of the commercial formulation. Belonging to the chemical group of triazolinones, its mechanism of action is the inhibition of photosystem II, presenting as main symptoms in sensitive plants, chlorosis, reduced growth, and leaf necrosis (Bayer, 2000). It should be emphasized that, in many situations, weed control must be maintained for long periods, with an urgent need to find solutions and/or alternatives that allow the use of residual action herbicides in areas with thick layers of straw. However, the ideal dose of Dinamic generates divergences, where currently in the package insert 1.5 - 2.0 kg/ha is recommended (Singh, 2020). Therefore, the present study aimed to evaluate the effect of different doses of Dinamic on sugarcane production.

MATERIALS AND METHODS

Area Information

Table 1. Area information for each farm, 63010 and 63728

Farm: 63010
Cut: 2°C
Variety: RB96 6928
First Application - 05/16/2019
T1 - Dinamic 0 kg/ha + Flumzyzin 0,3 kg/ha
T2 - Dinamic 0,8 kg/ha + Flumzyzin 0,3 kg/ha
T3 - Dinamic 1,2 kg/ha + Flumzyzin 0,3 kg/ha
T4 - Dinamic 1,4 kg/ha + Flumzyzin 0,3 kg/ha
T5 - Dinamic 1,8 kg/ha + Flumzyzin 0,3 kg/ha
T6- Dinamic 2 kg/ha + Flumzyzin 0,3 kg/ha
SecondApplication - 04/12/2019
T2 - Dinamic 0,8 kg/ha
Area History
* Mucuna
* *Ipomoea purpurea*
* *Panicum maximum*

Farm: 63728
Cut: 5°C
Variety: RB92579
First Application - 10/19/2019
T1 - Dinamic 0.8 kg/ha + Flumzyzin 0.3 kg/ha
T2 - Dinamic 1.4 kg/ha + Flumzyzin 0.3 kg/ha
SecondApplication - 01/28/2020
T1 - Dinamic 0.8 kg/ha+ Tractor2.0L/ha
T2 - Tractor2.0L/ha
Area History
* Mucuna
* *Panicum maximum*
* *Brachiaria brizantha*

Biometrics Methodology

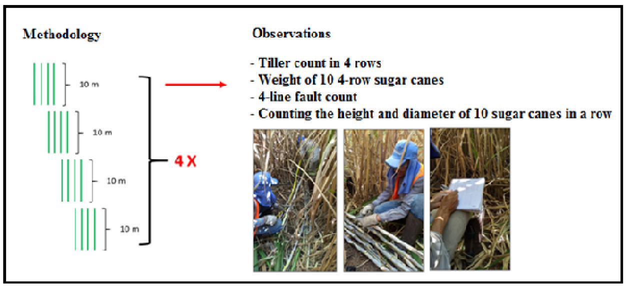


Figure 1. Biometrics Methodology

Monthly Rain in the Experiment Period – Farms 63010 and 6372

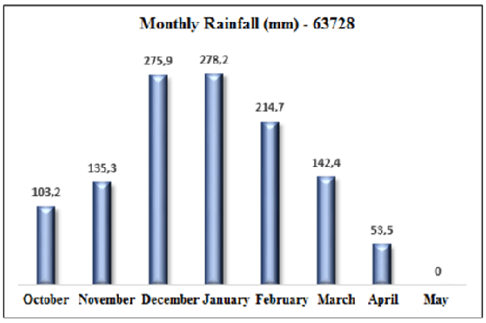


Figure 2. Monthly Rainfall in the Experiment Period, farm 63728

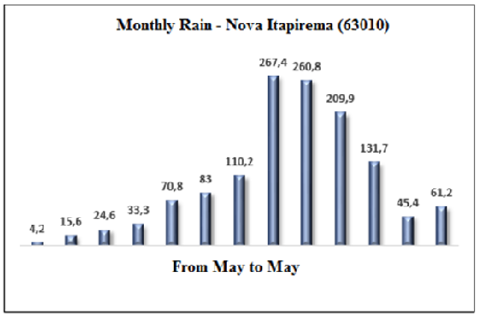


Figure 3. Monthly Rainfall in the Experiment Period, farm 63010

Monitoring image – Farms 63010 and 63728

Figure 4. Monitoring image

Soil Classification - Farms 63010 and 63728

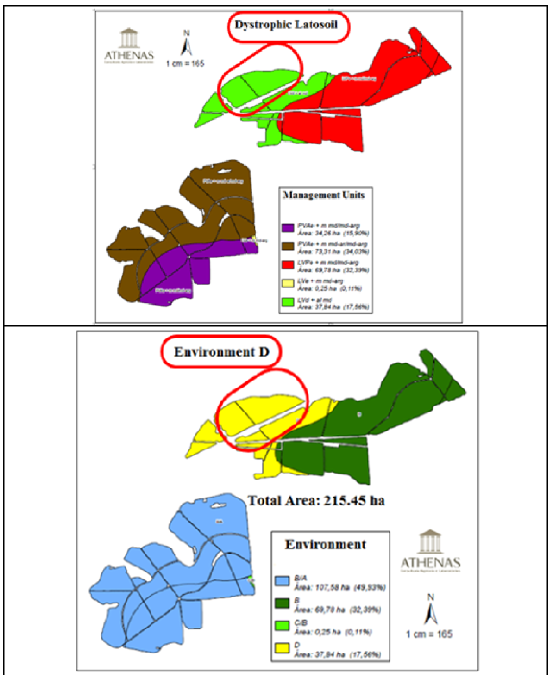
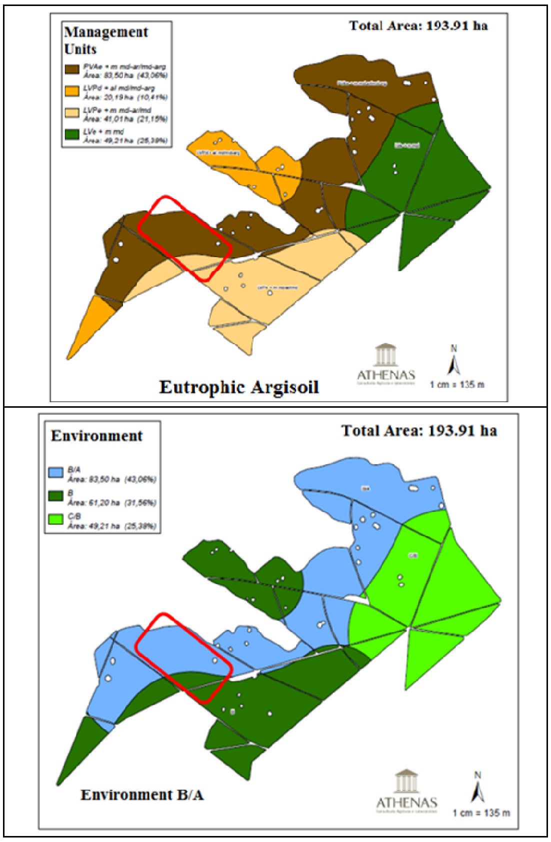


Figure 6. Soil Classification. Farm 63010



Statistical Analysis: Data were collected using a table previously built in Excel. Variables were presented in percentage, mean and standard deviation format. Depending on the Gaussian distribution (Normality test), comparisons of variables were performed using the One-Way ANOVA Test (Tukey) between the variables in the present study, considering $p<0.05$ with statistical significance, in the 95% CI. Statistical analysis was performed using the Minitab 18® program (version 18, Minitab, LLC, State College, Pennsylvania, USA).

RESULTS

The treatments showed no statistically significant difference ($p<0.05$; Tukey 5%) in a tonne of cane per hectare and internodes in both farms (Figures 7, 10, 11, and 15).

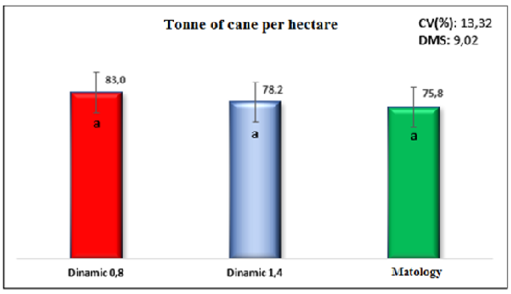


Figure 7. Tonne of cane per hectare in Treatments -63728

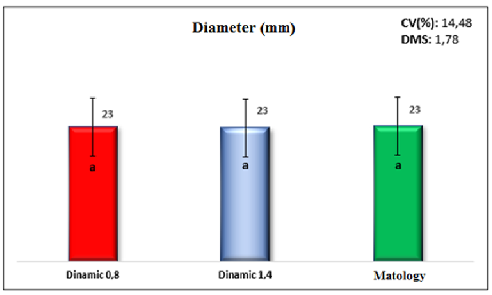


Figure 8. Diameter of Treatments -63728

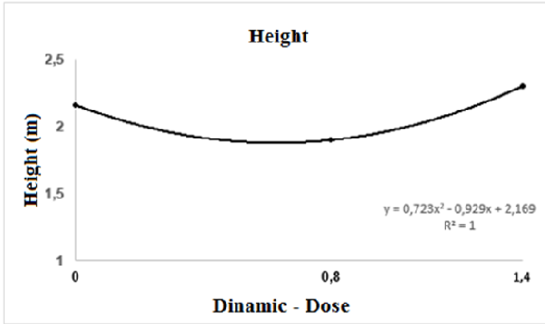


Figure 9. Height of Treatments -63728

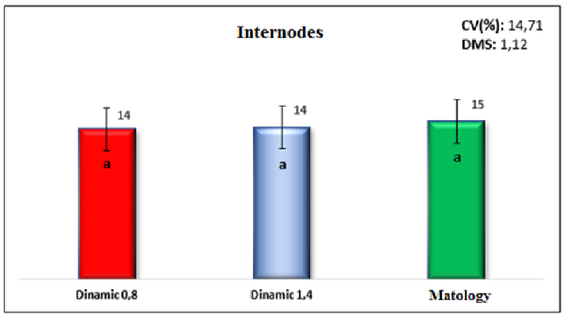


Figure 10. Internodes of Treatments -63728

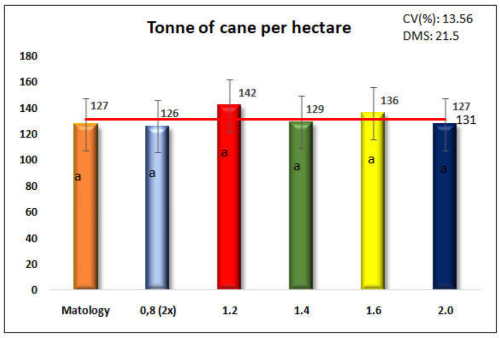


Figure 11. Tonne of cane per hectare of Treatments -63010

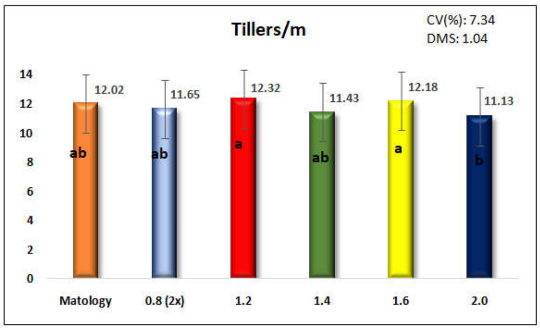


Figure 12. Treatment Tillers -63010

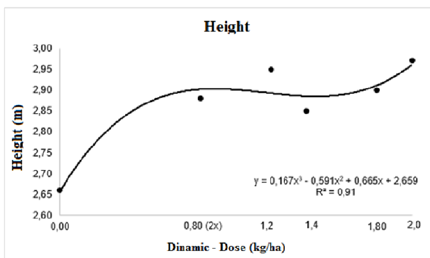


Figure 13. Height of Treatments – 63010

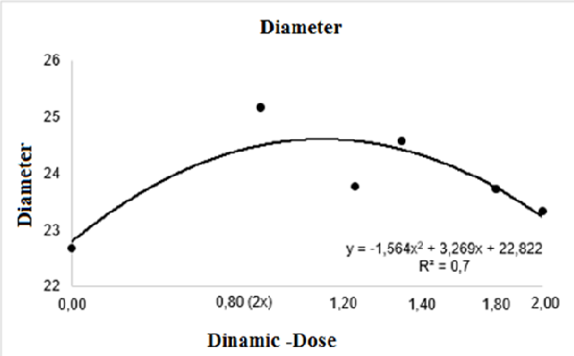


Figure 14. Diameter of Treatments -63010

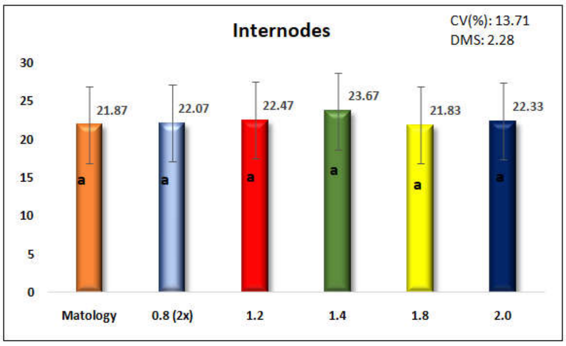


Figure 15. Treatments Internodes - 63010

Still, the diameter of farm 63728 did not show a statistical difference, however, in farm 63010 the diameter and tillers/m showed a statistically significant difference ($p<0.05$), with the best dose being 0.8 (2x) and 1.2/ 1.6 respectively (Figures 8,12 and 14). For height, the treatments showed a statistically significant difference ($p<0.05$; Tukey 5%), with Dinamic at 1.4 kg/ha being the best dose for this variable on farm 63728, and the best dose for farm 63010 was 2.0 kg/ha, and in both farms, the doses were higher than Dinamic (Figures 9 and 13).

DISCUSSION

Considering that straw can change the dynamics and efficacy of herbicides in the raw cane system and complement their action, the present study aimed to evaluate the effect of different doses of Dinamic on the production of sugarcane for control. of weeds present in various circumstances, including the possibility of absorbing the herbicide directly from sugarcane straw. In this context of results of the present study, a scientific work experimented with pots with four replications, in which, in addition to the controls with and without straw, amicarbazone was applied in different situations: on 5 t ha-1 of straw; on the soil later covered with 5 t ha-1 of straw; on the ground without straw cover and with or without stimulation of different amounts of rain applied before or after application of the product (Negrisoli, 2007). The dose of amicarbazone applied was 1,400 g ha-1 of active ingredient (a.i.), with syrup consumption equivalent to 200 L ha-1.
Thus, regardless of the weed evaluated, the highest control indices were achieved when amicarbazone was applied on straw, then simulating precipitation corresponding to 2.5 or 30 mm of rain, and in treatments where the herbicide was applied directly on bare or straw-covered soil. Thus, for I. grandifolia, B. plantaginea, and B. decumbens, higher levels of control were reached when amicarbazone reached the soil, both directly applied and when leached from straw by simulated rain after application. As for C. rotundus, the highest percentages of control were observed when amicarbazone was applied on straw, with rainfall simulation immediately after application, showing that leaching can be a fundamental process for an appropriate absorption and efficacy of the evaluated herbicide (Negrisoli, 2007). Still, studies showed that the weed sowing system proved to be fundamental for obtaining results with high uniformity. The main advantage of this methodology is to allow experiments to be carried out in practically any area, without the concern of identifying places with high infestation and species diversity. The repetition of the work at different times was essential to evaluate the effectiveness of amicarbazone and the different application methods (Negrisoli, 2007; Kaur, 2013; Singh, 2021). The set of experiments proved to be sufficient for the positioning of amicarbazone in raw sugarcane. In emphasis, in the first two seasons (application on July 27th and August 31st), characterized by dry periods after application or by initial rains of low intensity, the application on the harvester proved to be advantageous to the other application modalities.

This behavior was verified for all weed species studied (Toledo, 2009). Also, in applications carried out on October 4th and November 23rd, with fewer water restrictions, the best results for small seed species (Digitaria spp. and Panicum maximum) were obtained with conventional application on straw. The probable justification is the retention of rainwater by the straw (Maciel, 2005; Tofoli, 2002), reducing the herbicide leaching, but this observation still needs to be confirmed by the quantification of amicarbazone in the soil samples.

Furthermore, the presence of straw can keep the soil wetter at the time of application and the herbicide more available in the soil. Indeed, one author observed that when sulfentrazone interacts with dry soil, its availability in soil solution is practically half compared to that observed in soil kept moist (Rizzi, 2002). There is no information available for amicarbazone, but the behavior may be general for soil-applied herbicides. In the conventional system, without straw, there were control failures that made the use of amicarbazone unfeasible under similar conditions, with emphasis on the type of soil (Rizzi, 2002). In this sense, studies have shown that for small seed species and superficial germination, in applications carried out at the time with low initial water availability, the highest levels of efficacy of amicarbazone were observed with the application under straw in conjunction with harvesting (Carbonari, 2006).

In applications carried out at the end of the dry season and in the rainy season, the highest levels of efficacy of amicarbazone were observed with the conventional application on straw. In the application carried out at the end of October, in soil with high clay content and organic matter, the best results were observed in the application on the harvester, followed by those obtained from the conventional application on straw (Cavenaghi, 2006). Besides, for large seed species, in applications carried out at the time with low initial water availability, the highest levels of efficacy of amicarbazone were observed with the application in the harvester. In applications carried out at the end of the dry season and in the rainy season, the highest levels of control were observed for application in the combined harvester and conventional straw (Cavenaghi, 2006a).

CONCLUSION

It can be concluded that the treatments did not show a statistical difference in tonne of cane per hectare and internodes in both farms. Still, the diameter of farm 63728 did not show a statistical difference, however, in farm 63010 the diameter and tillers/m showed a statistically significant difference, with the best dose being 0.8 (2x) and 1.2/1.6 respectively. For height, the treatments showed a statistically significant difference, with Dinamic at 1.4 kg/ha is the best dose for this variable on farm 63728, and the best dose for farm 63010 was 2.0 kg/ha, and in both farms doses were higher than Dinamic.

CONFLICT OF INTERESTS: There is no conflict of interest between authors.

FUNDING: Nil.

ACKNOWLEDGMENTS: Nil.

REFERENCES

Negrisoli, E. *et al*. Controle de plantas daninhas pelo amicarbazone aplicado na presença de palha de cana-de-açúcar. Planta Daninha (online). 2007, v. 25, n. 3.p. 603-611. Disponível em: <https://doi.org/10.1590/S0100-83582007000300021>. Epub 03 Mar 2011. ISSN 1806-9681. https://doi.org/10.1590/S0100-83582007000300021.

Kaur M, Butcher RJ, Jasinski JP, Yathirajan HS, Siddaraju BP. Amicarbazone. Acta Crystallogr Sect E Struct Rep Online. 2013 Mar 28;69(Pt 4):o603. doi: 10.1107/S1600536813007782. PMID: 23634130; PMCID: PMC3629643.

Singh V, Dos Reis FC, Reynolds C, Elmore M, Bagavathiannan M. Cross and multiple herbicide resistance in annual bluegrass (Poa annua) populations from eastern Texas golf courses. Pest Manag Sci. 2021 Apr;77(4):1903-1914. doi: 10.1002/ps.6217. Epub 2020 Dec 29. PMID: 33284481.

Toledo, R.E.B. *et al*. Eficácia do herbicida amicarbazone aplicado sobre a palha ou no solo no controle de plantas daninhas na cultura da cana-de-açúcar. Planta Daninha (online). 2009, v. 27, n. 2 (Acessado 2 Setembro 2021) , pp. 319-326. Disponível em: <https://doi.org/10.1590/S0100-83582009000200015>. Epub 10 Jul 2009. ISSN 1806-9681. https://doi.org/10.1590/S0100-83582009000200015.

PERIM, Lucas *et al*. Eficácia do herbicida amicarbazone no controle em pós-emergência de espécies de corda-de-viola (Ipomoea grandifolia e Merremia cissoids). Revista Brasileira de Herbicidas, (S.l.), v. 8, n. 1, p. 19-26, abr. 2009. ISSN 2236-1065. Disponível em: <http://www.rbherbicidas.com.br/index.php/rbh/article/view/64>. Acesso em: 02 set. 2021. doi:https://doi.org/10.7824/rbh.v8i1.64.

Yu J, MpcCullough PE, Grey T. Physiological effects of temperature on turfgrass tolerance to amicarbazone. Pest Manag Sci. 2015 Apr;71(4):571-8. doi: 10.1002/ps.3853. Epub 2014 Aug 13. PMID: 25045054.

Agrianual. Anuário da agricultura brasileira. São Paulo: FNP Consultoria e Comércio, p.248-265, 2004.

Bayer. Weed control in Brazilian sugar cane cultivation: Sencor – an attractive alternative. Courier Agrochemistry, n.1, p.10-11, 2000.

Maciel, C.D.G; Velini, E.D. Simulação do caminhamento da água da chuva e herbicidas em palhadas utilizadas me sistemas de plantio direto. Planta Daninha, Viçosa, v.23, n.3, p.471-481, 2005.

Tofoli, G.R. *et al*. Dinâmica de atrazine em palha de aveia e cana-de-açúcar. In: CONGRESSO BRASILEIRO DA CIÊNCIA DAS PLANTAS DANINHAS, 23, 2002, Gramado. Anais... Gramado: SBCPD, 2002, p.158.

Rizzi, F.R. Resposta de solo à absorção de sulfentrazone em função de sua textura, matéria orgânica e umidade. 2002. Dissertação (Mestrado em Agronomia / Energia na Agricultura) - Faculdade de Ciências Agronômicas, Universidade Estadual Paulista, Botucatu, 2002.

Carbonari, C.A. *et al*. Eficácia e seletividade do herbicida dinamic (amicarbazone) no controle de Spermacoce latifolia, Ipomoea grandifolia, Merremia cissoides, Panicum maximum e Brachiaria plantaginea na cultura da cana-de-açúcar. In: CONGRESSO BRASILEIRO DA CIÊNCIA DAS PLANTAS DANINHAS, 25, 2006, Brasília. Resumos... Brasília: SBCPD, 2006a. p.360.

Cavenaghi, A.L.*et al*. Dinâmica do herbicida imazapic aplicado sobre a palha de cana-deaçúcar. In: CONGRESSO BRASILEIRO DA CIÊNCIA DAS PLANTAS DANINHAS, 25, 2006, Brasília. Resumos... Brasília: SBCPD, 2006a. p.360.

Cavenaghi, A.L.*et al*. *et al*. Performance do herbicida Dinamic aplicado sobre a palha de cana-de-açúcar. In: CONGRESSO BRASILEIRO DA CIÊNCIA DAS PLANTAS DANINHAS, 25, 2006, Brasília. Resumos... Brasília: SBCPD, 2006a. p.330.

****