MORPHO-PHYSIOLOGICAL BEHAVIOR OF *Commelina benghalensis* IN RESPONSE TO HERBICIDES APLIED IN POST-EMERGENCY

COMPORTAMENTO MORFO-FISIOLÓGICO DE Commelina benghalensis *EM RESPOSTA A HERBICIDAS APLICADOS EM PÓS-EMERGÊNCIA*

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ABSTRACT: Given the difficulty in controlling dayflower, the aim was to identify what herbicide provides the better control of *Commelina benghalensis* and the better developmental stage for its application. The plants were grown in pots containing 2 L Bioplant substrate and soil being maintained throughout the trial at a greenhouse. Experimental design was completely randomized with four replications in factorial 8 x 5, so seven herbicides in recommended commercial rates (atrazine, carfentrazone, flumioxazin, glyphosate, MSMA, nicosulfuron and paraquat) and control applied at 5 phenological stages adjusted to BBCH scale. It was observed that the plant phenological stage affects the efficiency of chemical control. Plants at early development stages (BBCH 11 and 12) were more susceptible to herbicides, occurring control in its entirety only with atrazine, carfentrazone, MSMA and paraquat. Despite suffering injuries, *C. benghalensis* showed tolerance to others treatments.

KEYWORDS: Dayflower. Phenological stage. Tolerance.

INTRODUCTION

Dayflower plants, belonging to Commelinaceae family, it are characterized by weeds difficult to control in different regions of the country (ROCHA et al., 2000). When it occurs in agriculture, they compete with crops for nutrients, water and light causing considerable economic losses to the farmer. In addition to competition, these plants may hinder grain harvest, by having a high water content in the stem, and hinder the full crop development, since they are a host of insects that directly affect the crop (PENCKOWSKI; ROCHA, 2006).

Due to the ease of vegetative propagation of the species, the mechanical control is inefficient. Already chemical control may be limited, since most of the herbicides have been shown to be inefficient in single application for *Commelina* species control in the adult stag, except 2,4-D (RONCHI et al., 2002). Wilson (1981) reports that the difficulty of controlling Commelinaceae family plants can be attributed to its double reproductive mechanism: by seeds and node rooting. Already according to Vega et al. (2010), the difficulty of controlling dayflower species is directly linked to the weed development.

Understanding the dynamics of weed species belonging to *Commelina* genus and its tolerance mechanisms to some recommended herbicides classes assist the management weed recommendation, preventing or delaying a selection pressure of specific species from genus, thus avoiding the selection of plants that have increased tolerance. As successively the same herbicides or different but with the same action mechanism are used, can occur selection of resistant biotypes or species tolerant to the product used (MONQUERO et al., 2005).

Applying herbicides to control different dayflower species can not to inhibit its development, possibly causing losses to the farmer, such as increased costs and reduced production (RODRIGUES et al., 2010). Given the difficulty in controlling dayflower, the aim of this study was to identify what herbicide provides the better control of *Commelina benghalensis* and what the better developmental stage for its application.

MATERIAL AND METHODS

The trial was conducted in a greenhouse at Universidade Estadual Paulista "Júlio de Mesquita Filho", in the municipality of Ilha Solteira/SP. Region climate according to Köppen classification is Aw, with rainy season in the summer and dry in winter, with an annual average temperature of 24.1°C, annual average rainfall of 1370 mm and annual average relative humidity of 64,8%.

Experimental design was completely randomized with treatments distributed in a factorial 8 x 5 with four replications. Treatments were constituted by seven different herbicides and control and five phenological stages of *C. benghalensis*

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adjusted to BBCH scale (HESS et al., 1997). Herbicides fator was composed by: 1) glyphosate (1920 g a. i. ha^{-1}); 2) carfentrazone ethyl (20 g a. i. ha^{-1}); 3) paraquat (400 g a. i. ha^{-1}; 4) nicosulfuron (40 g a. i. ha $^{-1}$); 5) MSMA (2370 g a. i. L ha-^{1}); 6) flumioxazina (25 g a. i. ha-1); 7) atrazina (2500 g i.a. ha^{-1}); and 8) Control. Applications of treatments were performed using backpack sprayer with constant pressure (CO_2) at 40 lb/pol^2, supplied by tank with two liters.

Phenological stages recorded at the time the applications were (BLEIHOLDER et al., 1991): two true leaves or leaf cartridge not distended – BBCH 11; three true leaves or leaf cartridge not distended – BBCH 12; First side visible stem – BBCH 21; two side visible stems – BBCH 22; and beginning of flowering, with twenty tillers – BBCH 51. Before sowing, the seeds were scarified through the pressure of a block on a hard surface in order to break their dormancy. After the scarification, seeds were sown, without quantification, at one cm deep in black plastic pots of 2 L containing Bioplant substrate (pinus bark + coconut fiber) and soil at 1:1 ratio, being irrigated once daily throughout the trial conduction. Soil used is classified as Oxisol eutrophic. After 14 days of plants germination, we carried out the thinned to four plants per pot.

Assessments carried out for the weeds were the following: plant height, dry biomass of shoot and root and electron transport rate. Plant height was checked after two months herbicide application. For the height analysis, the largest stem from the base above the vessel ground to the insertion of the last sheet was selected and measured. Quantification of dry mass was made from cutting the plant at the stem base. This samples were stored in paper bags and subsequently submitted to oven at 65°C until maintain a constant weight.

After removing the shoot, the quantification of root was performed, where it was held the soil sieving with the roots. Free excess substrate and soil, the roots were washed in sieves of smaller diameter, and then were submerged into a test tube with water for measuring the root volume. After obtaining the volume, roots had their excess water removed, and it were placed in paper bags and dried in an oven at 65°C until constant weight.

Assessments of electron transport rate (ETR) for weed species were performed by a portable fluorometer (OptiSciences - Multi-Mode Chlorophyll Fluorometer OS5p), at different periods after herbicide application. About the weeds, the evaluated intervals were as follows: before application, 1 h, 24 h, 48 h, 96 h, 168 h and 672 h hours after application, the reading being performed in the last unfolded sheet. In the plants with more branches, we measured the last unfolded leaf from increased branching of the plant. The values are presented in µMols electron m^{-2} s^{-1}.

Results obtained were submitted to the F-test in the analysis of variance for treatment effects using the Tukey's test for comparison of means at $p<0.05$ probability. All analyzes were performed with Sisvar software (FERREIRA, 2011).

RESULTS AND DISCUSSION

There was significant effect ($p<0.01$) of herbicides factor, phenological stages and the interaction between them on the variables plant height, dry biomass of shoot, dry biomass and volume root. Interaction between the herbicide and stages factors was significant for all morphological traits. The values of the coefficient of variation range from 42.2% to 72.09%. This possibly occurred because of different herbicides evaluated to cause or not the death of *C. benghalensis* plants in different phenological stages. There was no significant difference ($p<0.01$) of herbicides factors on the variable ETR before application, the same happened in the interaction of herbicides and stages on the ETR variables before the application and ETR 1 hour after application. In all other times, there was a significant interaction between the factors x herbicide application stages.

In the split herbicides within each developmental stage in relation to plant height it can be seen that the stages 22 and 51 there was no difference between treatments (Table 1) demonstrating that no treatment was effective in reducing the growth of *C. benghalensis* when applied at these stages. This suggests that the plant developmental stage caused these results, since herbicides may have different levels of weed control, depending on the developmental stage, the herbicide dose, application and environment conditions (FLECK et al., 2008). Herbicide atrazina, carfentrazone, glyphosate, MSMA and paraquat herbicides, when when applied at stages 11 and 12 occasioned the lowest values for the plant height of *C. benghalensis*, showing efficacy in controlling this weed. However, for the application at the stage 21 just carfentrazone and paraquat were effective in reducing the growth of *C. benghalensis.*

Table 1. Unfolding of significant interaction between herbicides management and phenological stages for plant height (cm) of *Commelina benghalensis* after two months herbicide application.

Herbicides	BBCH 11	BBCH 12	BBCH 21	BBCH 22	BBCH 51
Atrazina	0.00 bB	0.00 bB	11.88 abA	14.03 aA	21.15 aA
Carfentrazone	0.00 Bc	0.00 bC	5.50 bBC	15.24 aAB	22.72 aA
Flumioxazin	9.19 abB	1.44 bB	22.90 aA	24.22 aA	20.19 aA
Glyphosate	0.53 bB	0.00 bB	14.36 abA	19.13 aA	23.50 aA
MSMA	1.00 bB	0.00 bB	15.83 abA	20.37 aA	19.61 aA
Nicosulfuron	5.38 abC	7.69 bB	20.62 aA	17.21 aAB	25.03 aA
Paraquat	0.00 bC	0.00 bC	8.15 bBC	17.94 aAB	19.23 aA
Control	16.01 aA	19.63 aA	14.71 abA	21.52 aA	21.90 aA

Means followed by the same lowercase letters in the column and the same uppercase in the line do not differ by Tukey's test at 5% probability.

In unfolding stages of development within each herbicide, we verified that except the carfentrazone and paraquat, all herbicide reduced the *C. benghalensis* growth when applied at stages 11 and 12. Although there is statistical difference at stages 21, 22 and 51, it was found that during the flowering (stage 51) the action of herbicides in plant growth showed lower efficiency, reinforcing the hypothesis that application in different phenological stages influences weed control.

In terms of dry biomass of shoot, for the unfolding of herbicides within development stages, it was observed that in the last analyzed stages (21, 22 and 51) there was no difference between the used herbicides (Table 2). In stages 11 and 12, atrazina, carfentrazone, MSMA and paraquat herbicides occasioned 100% plant death while glyphosate had the lowest control. For unfolding development stages within the herbicides, flumioxazin and carfentrazone did not differ between stages analyzed, being carfentrazone the only herbicide that was able to achieve satisfactory results in all stages (Table 2). For other herbicides, the lowest averages were found in applications made at stages 11 and 12.

Table 2. Unfolding of significant interaction between herbicides management and phenological stages for dry biomass of shoot (g) of *Commelina benghalensis.* Ilha Solteira, 2015.

Herbicides	BBCH 11	BBCH 12	BBCH 21	BBCH 22	BBCH 51
Atrazina	0.00 cB	0.00 cB	5.69 aA	4.43 aA	2.10 aA
Carfentrazone	0.00 cA	0.00 cA	3.62 aA	3.24 aA	2.86 aA
Flumioxazin	4.71 abcA	2.40 cA	3.23 aA	6.38 aA	4.78 aA
Glyphosate	8.64 aAB	10.28 aA	4.09 aC	4.47 aBC	4.22 aC
MSMA	0.00 cB	0.00 cB	3.84 aAB	5.08 aA	3.10 aAB
Nicosulfuron	2.07 bcB	4.62 bcAB	6.51 aA	4.05 aAB	2.14 aB
Paraquat	0.00 cB	0.00 cB	6.92 aA	5.36 aA	3.90 aAB
Control	5.34 abA	7.33 abA	6.68 aA	3.63 aA	4.43 aA

Means followed by the same lowercase letters in the column and the same uppercase in the line do not differ by Tukey's test at 5% probability.

It was found at stages 11, 24 and 22 an accumulation of dry biomass higher to the Control in the treatment with glyphosate, suggesting a growth stimulus caused by the herbicide. Rocha et al. (2007) verified in *C. erecta* treated with glyphosate isolated that plants tend to accumulate more biomass than the Control, also noting that there was a growth stimulus. Despite the herbicides do not show statistical differences when applied at stages 21, 22 and 51, a dry biomass accumulation was also observed in the treatment paraquat at stage 21, with atrazina, MSMA and nicolsulfuron at stage 22, and with flumioxazin at stages 22 and 51.

In the unfolding herbicides within phenological stages for biomass of root (Table 3), the herbicides showed no difference at stages 11 and 51. Already at the stage 22, all showed means lower compared to the control. In stage 21, except nicosulfuron, herbicides inhibited root growth, which is more significant in the treatments carfentrazone, MSMA and paraquat. Probably, this expression can be explained as a consequence of the action mechanism of herbicides, so that MSMA causes dehydration of susceptible plants (Rodrigues and Almeida, 1998), paraquat causes destruction of the membranes (Martins, 2013) and carfentrazone promotes lipid peroxidation and disruption of cell membranes and subsequent cell death (Christoffoleti et al., 2006.). The treatments atrazina, carfentrazone, MSMA and paraquat showed differences compared to the Control at the stage 12, showing complete inhibition of root development, since they caused the death of almost 100% of the plants.

Table 3. Unfolding of significant interaction herbicides management and phenological stages for dry biomass of root (g) of *Commelina benghalensis.* Ilha Solteira, 2015.

Herbicides	BBCH 11	BBCH 12	BBCH 21	BBCH 22	BBCH 51
Atrazina	0.00 aB	0.00 bB	1.05 bcB	1.00 aB	3.16 aA
Carfentrazone	0.00 aB	0.00 bB	0.60 cAB	1.40 aAB	2.22 aA
Flumioxazin	1.00 aAB	0.30 abB	1.46 bcAB	2.60 aA	1.65 aAB
Glyphosate	0.75 aA	0.59 abA	1.30 bcA	1.73 aA	1.93 aA
MSMA	0.00 aB	0.00 bB	0.86 cAB	1.25 aAB	2.17 aA
Nicosulfuron	0.70 aB	1.07 abB	2.98 abA	1.50 aAB	1.23 aAB
Paraquat	0.00 aA	0.00 bA	0.60 cA	1.50 aA	1.25 aA
Control	0.92 aB	2.30 aB	4.96 aA	4.75 bA	2.14 aB

Means followed by the same lowercase letters in the column and the same uppercase in the line do not differ by Tukey's test at 5% probability.

When analyzed the unfolding of developmental stages within herbicides found that paraquat and glyphosate showed satisfactory results at all stages showing no difference between them. Except for flumioxazin and nicosulfuron, the other showed superior efficacy compared to the application at flowering.

In terms of root volume for the unfolding of herbicides within phenological stages, at the stage 11 there was no difference between treatments, and at the stage 12 treatments differed from the control (Table 4). The highest averages were found when applied treatments in advanced stages of *C. benghalensis.* In the unfolding of phenological stages within the herbicides carfentrazone was the only herbicide that do not show differences between all stages. In the initial stages, 11 and 12, all herbicides had means lower than the other stages, which demonstrates efficacy in control of *C. benghalensis* at initial stages.

Table 4. Unfolding of significant interaction herbicides management and phenological stages for root volume (cm^3) of *Commelina benghalensis.* Ilha Solteira, 2015.

Herbicides	BBCH 11	BBCH 12	BBCH 21	BBCH 22	BBCH 51
Atrazina	0.00 aC	0.00 bC	8.00 bBC	10.25 bcB	23.00 aA
Carfentrazone	0.00 aB	0.00 bB	5.25 bB	6.50 cB	18.75 abA
Flumioxazin	7.50 aBC	4.75 bC	12.50 ABCb	19.50 bA	16.00 abAB
Glyphosate	7.00 aB	5.00 bB	13.75 bAB	15.00 bcAB	20.00 abA
MSMA	0.00 aB	0.00 bB	8.00 bAB	14.25 bcA	11.75 bA
Nicosulfuron	7.25 aB	10.50 bB	27.00 aA	15.00 bcB	16.00 abB
Paraquat	0.00 aB	0.00 bB	5.75 bAB	14.00 bcA	12.75 abA
Control	8.75 aC	22.00 aB	26.25 aAB	34.25 aA	17.00 abBC

Means followed by the same lowercase letters in the column and the same uppercase in the line do not differ by Tukey's test at 5% probability.

The unfolding of herbicide within phenological stage 24 hours after application showed differences between all treatments. The herbicide carfentrazone had wilting in plants and a reduction of 100% in the ETR at stages 11 and 12, providing a lower photosynthesis (Table 5), the same happening for Girotto et al. (2011), where verified total inhibition of ETR in *Ipomoea grandifolia* 24 hours after application. Low ETR values mean greater action of herbicides on plants. Although not represent 100%, a similar ETR behavior was found in the paraquat and atrazine herbicides, however only paraquat had wilting. The other treatments did not show symptoms, having noticed that even without symptoms fluorometer detects the injuries caused by the herbicides.

Table 5. Unfolding of significant interaction herbicides management and phenological stages for ETR (µMols electron m^{-2} s^{-1}) 24h after application. Ilha Solteira, 2015.

Herbicidas	BBCH 11	BBCH 12	BBCH 21	BBCH 22	BBCH 51
Atrazina	0,25 cB	4,00 cB	6,00 cB	9,75 bB	89,00 cA
Carfentrazone	0,00 cB	0,00 cB	14,75 bcB	12,25 bB	124,75 abcA
Flumioxazin	107,50 aA	112,00 aA	51,75 abB	48,25 abB	141,50 aA
Glyphosate	42,50 bB	47,50 bB	79,00 aB	44,00 abB	134,50 abA
MSMA	66,50 bBC	90,25 aB	39,50 abcC	34,50 abC	143,00 aA
Nicosulfuron	83,00 abAB	108,25 aA	27,00 bcC	49,25 abBC	98,50 bcA
Paraquat	0,00 cA	0,25 cA	6,75 cA	10,25 bA	10,0 dA
Control	73,25 abB	117,75 aA	45,25 abBc	65,500 aB	144,75 aA

Means followed by the same lowercase letters in the column and the same uppercase in the line do not differ by Tukey's test at 5% probability.

In the unfolding of phenological stage within herbicides, it was observed that paraquat was the only herbicide that did not differ between stages. Atrazine, glyphosate and carfentrazone herbicides showed differential activity only at the stage 51, however, all the herbicides had low reduction in ETR at this stage. Analyzing the unfolding of herbicides within stage 48 after application, it was found that the carfentrazone herbicide caused widespread chlorosis in 100% of the plants at the stage 11 and 12, occurring the same behavior with paraquat at the same stages showing complete inhibition of ETR on both treatments. Atrazine, although not totally eliminate plants promoted similar reduction in ETR. Stages 21 and 22 showed no difference between treatments.

Atrazina, MSMA and paraquat not differ as to applied stage (Table 6). Carfentrazone, which caused death of plants at stages 11 and 12 caused the opposite during flowering, which showed high ETR. Therefore, paraquat showed the best result in all stages applied.

Table 6. Unfolding of significant interaction herbicides management and phenological stages for ETR (µMols electron m^{-2} s^{-1}) 48h after application. Ilha Solteira, 2015.

Herbicides	BBCH 11	BBCH 12	BBCH 21	BBCH 22	BBCH 51
Atrazina	0.00 bA	A 1.00 bA	7.00 aA	5.25 aA	10.25 bA
Carfentrazone	0.00 bB	B 0.00 bB	6.75 aB	11.50 aB	93.75 aA
Flumioxazin	93.25 aB	109.25 aAB	31.00 aC	24.25 aC	154.25 aA
Glyphosate	50.75 abB	72.25 a A	44.25 aB	26.25 aB	127.00 aA
MSMA	46.75 abA	84.75 aA	39.50 aA	44.75 aA	95.50 aA
Nicosulfuron	107.00 aA	115.00 aA	28.50 aC	47.00 aBC	93.00 aAB
Paraquat	0.00 bA	0.00 bA	1.50 aA	6.25 aA	4.50 bA
Control	111.00 aA	127.50 aA	39.50 aB	51.00 aB	120.00 aA

Means followed by the same lowercase letters in the column and the same uppercase in the line do not differ by Tukey's test at 5% probability.

For unfolding of herbicides within phenological stages 96 hours after application, all herbicides showed differences (Table 7). Nicosulfuron was the only herbicide at stages 11 and 12 that showed no difference compared to the control. It was also verified the death of the plants that suffered action of paraquat and carfentrazone at the stage 21. Glyphosate did not differ with the control at stages of greater plant development. Different results were observed by Corniani et al.

(2011), which verified that glyphosate showed a significant reduction in in ETR *Brachiaria decumbens*.

Table 7. Unfolding of significant interaction herbicides management and phenological stages for ETR (µMols electron m^{-2} s^{-1}) 96h after application. Ilha Solteira, 2015.

Herbicides	BBCH 11	BBCH 12	BBCH 21	BBCH 22	BBCH 51
Atrazina	0.00 cA	0.00 dA	7.75 cA	4.25 dA	6.75 dA
Carfentrazone	0.00 cB	0.00 dB	0.00 cB	38.25 cdA	28.75 cdAB
Flumioxazin	16.25 bcB	24.25 cdB	66.00 bA	43.25 cdAB	29.00 cdB
Glyphosate	22.00 bcC	62.40 bcB	94.25 abAB	95.75 abAB	104.25 aA
MSMA	11.50 bcB	15.25 dB	59.25 bA	79.00 bcA	57.00 bcA
Nicosulfuron	46.00 abC	78.50 abBC	112.750 aAB	131.75 aA	79.25 abBC
Paraquat	0.00 cB	0.00 dB	0.00 cB	106.75 abA	6.25 dB
Control	75.50 aB	103.75 aAB	125.00 aA	124.75 aA	102.25 aAB

Means followed by the same lowercase letters in the column and the same uppercase in the line do not differ by Tukey's test at 5% probability.

One week after herbicide application, equivalent to 168 hours, for unfolding of herbicides within stages all herbicides showed differences among herbicides used (Table 8). For stage 11 all herbicides decreased the ETR, and at the stage 12 only nicosulfuron showed no difference compared to the control. For the stages 21, 22 and 51, glyphosate and nicosulfuron similar values to the control, emphasizing that treatment with glyphosate showed ETR values superior to control at flowering probably caused due to tolerance that *C. benghalensis* present to glyphosate. Analyzed the unfolding of phenological stages within each herbicide, difference between the stadiums for atrazine, carfentrazone and paraquat was not verified. ETR in plants with atrazine for the stages 11, 12, 21 and 22 was 100%, however the plants at the stages 21 and 22 were not dead. They presented dry leaves and green stems. Plants that suffered with the paraquat action, at the stage 21 began to show recovery, with budding.

Table 8. Unfolding of significant interaction herbicides management and phenological stages for ETR (µMols electron m^{-2} s^{-1}) 168h after application. Ilha Solteira, 2015.

Herbicidas	BBCH 11	BBCH 12	BBCH 21	BBCH 22	BBCH 51
Atrazina	0.00 cA	0.00 cA	13.75 bA	14.00 cdA	3.50 dA
Carfentrazone	0.00 cA	0.00 cA	0.00 bA	0.00 dA	25.250 cdA
Flumioxazin	26.25 bcAB	6.50 cB	11.50 bB	4.50 dB	57.500 cA
Glyphosate	37.50 bcC	53.75 bBC	75.75 aB	47.00 abcBC	125.750 aA
MSMA	15.25 bcC	10.50 cC	60.50 aAB	23.250 cdBC	65.25 bcA
Nicosulfuron	61.50 bB	79.25 abAB	84.50 aAB	85.25 aAB	99.75 abA
Paraquat	0.00 cA	0.00 cA	13.25 bA	37.250 bcdA	8.75 dA
Control	108.25 aB	112.00 aB	83.00 aAB	66.250 abB	115.75 aA

Means followed by the same lowercase letters in the column and the same uppercase in the line do not differ by Tukey's test at 5% probability.

We observed for the unfolding of herbicides on phenological stages 672 hours after application that after 1 month, all treatments were significantly different, however there was a recovery of ETR in some plants (Table 9). Girotto et al. (2011) verified similar results, on wich amicarbazone inhibited 100% of the ETR in *I. grandifólia*, subsequently occurring ETR recovery, with value close to the initial at 350 hours after application. Atrazine, carfentrazone and paraquat showed recovery of ETR at stages 21 and 22. Despite the recovery after applying atrazine, the stages did not differ between treatments, presenting different behavior for the other treatments.

Table 9. Unfolding of significant interaction herbicides management and phenological stages for ETR (µMols electron m^{-2} s^{-1}) 672h after application. Ilha Solteira, 2015.

Herbicides	BBCH 11	BBCH 12	BBCH 21	BBCH 22	BBCH 51
Atrazina	0.00 cA	0.00 cA	40.50 bA	23.75 bA	0.00 bA
Carfentrazone	0.00 cB	0.00 cB	27.75 bAB	65.50 bA	0.00 bB
Flumioxazin	51.75 bB	81.50 bBC	131.50 aA	140.25 aA	0.00 bC
Glyphosate	0.00 cB	10.00 cB	136.50 aA	130.50 aa	117.25 aA
MSMA	10.00 bcB	0.00 cB	108.75 aA	131.00 aA	28.75 bB
Nicosulfuron	40.75 bcCD	81.50 bBC	133.25 aA	126.00 aAB	24.00 bD
Paraquat	0.00 cB	0.00 cB	32.25 bB	127.75 aA	0.00 bB
Control	160.00 aA	161.75 aA	125.00 aA	130.25 aA	127.25 aA

Means followed by the same lowercase letters in the column and the same uppercase in the line do not differ by Tukey's test at 5% probability.

Atrazina, carfentrazone MSMA and paraquat have similar ETR values in the stages 11, 12 and 51, unlike previous readings in which the stage 51 showed less control. However, the plants were in full recovery of injuries caused by chemical control, with many dry leaves, some arising from the use of herbicides, other due to the phenological stage in which they were.

CONCLUSIONS

Phenological stage where *C. benghalensis* is at the time of application influences its control.

C. benghalensis, in all phenological stages, it is tolerant to the dose applied of flumioxazin, glyphosate and nicosulfuron herbicides.

Atrazina, carfentrazone, MSMA and paraquat herbicides resulted in total control during the early stages (11 and 12).

RESUMO: Em face a dificuldade no controle da trapoeraba, o objetivo deste trabalho foi identificar qual herbicida proporciona o melhor controle de *Commelina benghalensis* e qual o melhor estádio fenológico para sua aplicação. As plantas foram cultivadas em vasos de 2 L contendo substrato Bioplant e solo, sendo mantidas durante todo o experimento em casa de vegetação. O delineamento experimental utilizado foi inteiramente casualizado com 4 repetições, em esquema fatorial 8 x 5, composto por sete herbicidas em (atrazina, carfentrazone, flumioxazin, glyphosate, MSMA, nicosulfuron, paraquat) e uma testemunha, aplicados em 5 estádios fenológicos ajustados à escala BBCH. Observou-se que o estádio fenológico das plantas tem influência na eficiência do controle químico. Plantas em estádios iniciais de desenvolvimento (BBCH 11 e 12) mostraram-se mais suscetíveis aos herbicidas, ocorrendo controle em sua totalidade somente com atrazina, carfentrazone, MSMA e paraquat. Apesar de sofrer fortes injúrias a *C. benghalensis* apresentou tolerância aos demais tratamentos não ocorrendo a morte das plantas.

PALAVRAS-CHAVE: Trapoeraba. *E*stádio fenológico. Tolerância.

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