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Investigating the Effectiveness of Allion (Indaziflam) on Control of Purple Nutsedge in Sugarcane

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Abstract: The objective of this research was to evaluation the efficacy of indaziflam on control of purple nutsedge in sugarcane fields in Khouzestan, Iran. Trial was randomized complete block design with four replications per treatments. Variety and type of culture were Cp69-102 and plant, respectively. Treatments were 1-indaziflam (75 g ai ha^{-1}, as preemergence); 2-indaziflam (50 g ai ha^{-1} as preemergence); 3- Trifloxysulfuron sodium+ametryn (1875 g ai ha^{-1}, as postemergence); 4-2,4-D+MCPA (1687.5 g ai ha^{-1}); 5-2,4-D+MCPA+metribuzin (1350 g ai ha^{-1}+1400 g ai ha^{-1}); 6- weeding and 7- weed infested. The herbicides were applied with backpack sprayer equipped with flooding and teejet nozzles calibrated to deliver 300 L ha^{-1}. Measuring quantitative traits were dry weight and density reduction percentage of purple nutsedge, and stem length, stem weight, the middle internode diameter and length of sugarcane. Measuring qualitative traits were purity, pol and recoverable sugar of sugarcane. Statistical calculations were accomplished through the SAS9.2 software and graphs were drawn by the Excel software. The results showed that purple nutsedge responses varied in response to experimental herbicides. Across all herbicides, indaziflam as 75 g ai ha^{-1} affected purpule nutsedge growth as dry weight and density reduction percentage of purple nutsedge was reduced 100% until 30 day after treatment (DAT). However, indaziflam efficacy was reduced over time. Other herbicides such as indaziflam as 50 g ai ha^{-1} and trifloxysulfuron sodium+ametryn indicated good effect in purple nutsedge control compared with 4-2,4-D+MCPA and 2,4-D+MCPA+metribuzin. Poor efficacy of post emergence herbicides may be due to high amont of wax present on the surface of nutsedge leaves that may be a factor limiting these herbicides absorption relative to other weeds lacking similar epicuticular wax. Measurment of quantitative traits indicated indaziflam (75 g ai ha^{-1}) was the greatest in stem length (241.44 cm), stem weight (120 t ha^{-1}), the middle internode diameter (1.83 cm) and length (14.5 cm) of sugarcane. Indaziflam (50 g ai ha^{-1}) showed no significant difference with indaziflam (75 g ai ha^{-1}) in stem length, stem weight, the middle internode diameter and length. trifloxysulfuron+ametryn exception stem length and the middle internode length showed significant difference with indaziflam (50 g ai ha^{-1}). 2, 4-D+MCPA exception the middle internode diameter showed no significant difference with weed infested treatment. Purity, pol and recoverable sugar of sugarcane were greatest in application of indaziflam (75 g ai ha^{-1}). Other herbicides such as indaziflam (50 g ai ha^{-1}) and trifloxysulfuron sodium+ametryn were better than the other herbicides. Present research indicated indaziflam could control purpule nutsedge in sugarcane field; although indaziflam efficacy was reduced over time. However, there were no adverse effects of indaziflam rates on sugarcane observed, therefore, this herbicide could be used in sugarcane fields.

Keywords: Purity, Pol and Recoverable Sugar, The Middle Internode Length and Diameer

1. Introduction

Sugarcane with the scientific name (Saccharum officinarum L.), a perennial species [18], tropical and subtropical, and one of the important sources of energy supply in the human diet, and its products are also of particular importance in the industry. Weeds are the most important factors limiting sugarcane cultivation; They are able to reduce the yield of this crop by competing fr water, nutrients and light during the

growing season [1]. Sugarcane has a vegetative stage sensitive to weed competition, which is about 3-6 weeks from the time of planting in the hot and humid season [15]. Therefore, weed control at the beginning of the growing season before closing the sugarcane canopy and covering more than half of the planting rows is very critical [1].

Purple oyarsalam (Cyperus rotundus L.) is one of the most problematic weeds in crops, which interferes with the crop growth process by competing for light, water, food and space, as well as having allelopathy [9]. The invasive nature of this species is due to the rapid growth and development of its tubers, which enables it to survive in stressful agricultural conditions [9].

Indaziflam is an alkylazine herbicide belonging to group 29 [8]. that inhibits cellulose synthesis in susceptible species [2, 3, 8, 16]. Its preemergence application is able to effectively control annual bluegrass in warm season lawns [3, 13, 16]. It was also registered in the United States in 2010 as a pre-emergent herbicide for the control of annual longleaf and broadleaf weeds in citrus orchards, commercial orchards, lawns, roadsides, railroad tracks, and non-crop lands [10, 11]. The dosage of indaziflam is approximately 10 to 15 times less than most preemergence herbicides, but its residues have significant activity that may lead to an increase in the period of weed control from fall to spring [5]. As De Barreda et al. [5]. reported that despite treatment with indaziflam eight months before planting bermudagrass, amounts of indaziflam <35 g/ha resulted in a significant reduction in bermudagrass establishment. Also, Schneider and colleagues [17]. in an experiment on the effect of soil texture and organic matter on the effect of indaziflam on the control of bermudagrass (Cynodon dactylon L. Pers.) reported that the growth of bermudagrass in pure sand, regardless of the amount of indaziflam, caused the most damage, with It showed a decrease of >10% and >32% in the roots and shoots of Bermudagrass, respectively, compared to the control treatment (no use of indaziflam) at 38 days after treatment.

So far, 14 herbicides have been recommended for use in sugarcane fields, among which 8 herbicides belong to the group of photosystem 2 inhibitors [20]. Also, most of these herbicides are pro-emergent with significant residual activity. Considering the widespread use of herbicides in sugarcane fields in Khuzestan province and the emergence of weed resistance to triazine inhibitors [6]. It seems that in the future, more care should be taken to register herbicides in sugarcane fields and the variety of herbicides More attention should be paid to the place of operation. The aim of this study was to investigate the effectiveness of indaziflam herbicide in controlling purple weevil in sugarcane and its effect on the yield and damage to sugarcane.

2. Materials and Methods

This experiment was conducted in the crop year of 2015 in Shuaibieh region, located 40 kilometers south of Shushtar city (longitude 48 degrees 5 minutes to 48 degrees 37 minutes east and latitude 31 degrees 37 minutes to 32 degrees north with a height of 8 meters above sea level.) Done. Accomplished. The experiment was conducted using Cp69-1062 cultivar in the form of a randomized complete block design with 7 treatments and 4 replications. Each experimental unit had an area of 44 square meters, which included 6 furrows (each with a width of 1.84 meters) and 6 cultivation lines. It should be noted that there were 2 sugarcane planting lines on each stack at a distance of 60 cm from each other (pineapple planting method). The third crop line was considered as the final harvest, and the two lines at the end of each plot were considered as margins. Fertilization of 300 kg per hectare of urea and the same amount of triple superphosphate was given to the field in the form of 75 kg base before planting and the rest in three times (75 kg in early March, 75 kg in early May and 75 kg in early June). The applied herbicide treatments were: 1- Indaziflam at the rate of 50 grams of effective substance per hectare (equivalent to 100 grams of commercial substance per hectare, 500 SC) in pre-emergence form; 2- Indaziflam at the rate of 75 grams of effective substance per hectare (equivalent to 150 grams of commercial substance per hectare) in pre-emergence form; 3-trifluoxysulfuron + amethrin at the rate of 1875 grams of pure substance per hectare (2.5 kg per hectare of commercial substance, WG75%) as post-emergence; 4-To, 4-D + MCPA at the rate of 1687.5 grams of pure substance per hectare (2.5 liters per hectare of commercial substance, SL 72%) as post-emergence; 5- Tou mixture, Four-D + MCPA (1350 grams of effective substance per hectare, equivalent to 2 liters per hectare) + Metribiozin (1400 grams of effective substance per hectare, 70% WP) as post-emergence; 6- weed-free control (weeded) and 7- weed-infested control (without herbicide treatment).

Spraying was carried out with a rechargeable backpack sprayer with a pressure of 2 bar, which was calibrated to spray 300 liters of water per hectare and was carried out with a 11003 wind-powered nozzle. In order to investigate the effect of pesticides on the control of purple weed and their effect or lack of effect on sugarcane, factors such as density and dry weight of weeds were measured after spraying six times (every two weeks). In order to determine the dry weight of Oyarsalam, the green parts were removed from the soil surface and dried in the oven at 72 degrees Celsius for 48 hours and then weighed. Quantitative traits measured at the time of sugarcane harvest included stem height, internode length, internode diameter, and stem weight. During the implementation of the plan, simultaneously with the growth of the sugarcane plant, in order to determine the growth trend in different treatments and to detect the effect or lack of effect of herbicides on the growth of sugarcane in each treatment, the height of 20 stems of 20 sugarcane plants that were marked as indicators were measured. To measure the length of the middle internode, the distance between the two middle nodes of the cut stems was measured with a ruler and their average was recorded. Then, the diameter of the middle internode of the cut stems was recorded by the measuring caliper and their average as the data of the middle internode

diameter of each experimental unit. In order to measure the weight of the stem, the stems of each plot were cut from the surface of the ground and after separating the reed head from the last node and separating the leaves, the stems without leaves and stamens were weighed using a 300 kg scale.

In order to measure the quality traits, at the time of harvesting, 20 ripe stems were taken from the two middle lines of each plot for qualitative analysis and transferred to the laboratory. The extract of harvested stems was extracted using a three-roller Cuban mille device and after filtering 50 ml of it using Whatman 40 filter paper, the Brix percentage (amount of dissolved solids) using a refractometer (Schmidt, Dur-Sw, Schmi), Schmidt, Canada) was read with an accuracy of 0.01%. Then, 1.5 grams of divalent alkaline lead acetate with three molecules of water was added to 100 ml of extract and after mixing and filtering, the percentage of bridges (right round sugars) was measured using a polarimeter (Schmidt, Saccharomat Nir W2 Schmidt, Canada) with accuracy. 0.01 was measured. The degree of purity of sherit and the amount of extracted sugar were calculated based on equations (1), (2) and (3).

$$100 \times (\text{brix} / \text{bridge}) = \text{syrup purity (percent)} \quad (1)$$

$$\text{Product yield} \times \text{percentage of raw sugar} = \text{produced sugar (tons per hectare)} \quad (2)$$

$$\text{QR}/100 = \text{percentage of raw or yellow sugar} \quad (3)$$

In equation 3, QR is the quality ratio of the syrup, which is calculated based on the related tables. The data was analyzed using SAS 9.2 software and Excel software was also used to draw figures.

3. Results and Discussion

The comparisons of the percentage reduction in the number of weeds (Table 1) showed that the highest efficiency in controlling Oyarsalam was related to the herbicide indaziflam (75 grams of effective substance per hectare); So that until the fourth sampling (56 days after applying the herbicide treatment), the plants of Oyarsalam were 100% controlled. Since Oyarsalam is a perennial weed, in the case of preemergence herbicides, due to the reduction of the effect of the herbicide on the soil and regrowth from the remaining tubers in the soil, the effectiveness of the herbicide decreased in subsequent samplings. Also, the amount of 50 grams of effective substance per hectare of Indaziflam was able to effectively control Oyar Salam; So that the trend of effect over time was similar to the higher amount of the mentioned herbicide, and both herbicides did not have a significant difference ($P \leq 0.05$) with the weed control in terms of efficiency in controlling Oyar Salam until the third sampling. The most ineffective herbicide was 4-D + MCPA with the highest density reduction percentage of 67.57% and the lowest by 25.26% at the end of sampling. The two herbicides trifluoxysulfuron + amtrin and To, Four-D + MCPA + metribyozin were the most effective after indaziflam (100 g/ha) in controlling Oyarsalam.

As Table 2 shows, the greatest decrease in fresh and dry weight percentage in Oyarsalam control was related to indaziflam herbicide (75 grams of effective substance per hectare); So that until the fourth sampling (56 days after applying the herbicide treatment), Oyarsalam plants were 100% controlled and had no significant difference ($P \leq 0.05$) with the weed control. Also, the amount of 50 grams of effective substance per hectare of Indaziflam was able to effectively control Oyar Salam; So that up to 90 days after spraying, it was able to apply 85.09% reduction in the dry weight of Oyarsalam and it had a significant difference with the weeding control (100%). Other herbicides, including trifluoxysulfuron + amethrin and tofordi + MCPA + metribyozin, were placed in the next categories in terms of efficiency in reducing fresh and dry weight of Oyarsalam. Brosnan et al. [3]. reported that regardless of timing of indaziflam application, all doses of indaziflam effectively controlled soft crabgrass [Digitaria ischaemum (Schreb.) Schreb. ex Muhl.] controlled. The control of crab grass in 195 days after the early growth treatment varied from 91 to 95% and never reached less than 89%. The methods of applying indaziflam as pre-emergence and early post-emergence were similar, so that the control was never more than 95% in 195 days after treatment. Crabgrass control was reduced by early-emergence application of indaziflam during the growing season.

Table 1. *Analysis of variance (mean squares) of purple nutsedge density and dry weight reduction (%) in sugarcane.*

Source of variations	Degree of freedom	Purple nutsedge density reduction					
		90 DAT	90 DAT	75 DAT	60 DAT	45 DAT	30 DAT
Replication	3	41.94*	48.44**	105.33**	24.32^{ns}	4.04^{ns}	19.19^{ns}
Treatment	5	3019.88**	3296.68**	2723.89**	2476.21**	2555.28**	2009.26**
Error	15	13.71	8.39	16.53	16.41	8.34	19.89
Coefficient of variances (%)	-	11.04	9.35	8.8	5.92	7.62	5.43

Table 1. *Continued.*

Source of variations	Degree of freedom	Purple nutsedge dry weight reduction					
		15 DAT	75 DAT	60 DAT	45 DAT	30 DAT	15 DAT
Replication	3	3.19^{ns}	64.81**	40.99**	3.99^{ns}	1.11^{ns}	2.098^{ns}
Treatment	5	1062.39**	2830.08**	2881.25**	10669.19**	1315.37**	764.24**
Errorخطا	15	7.46	10.42	12.07	4.63	4.73	6.61
Coefficient of variances (%)	-	7.18	10.42	9.25	8.15	9.28	10.25

^{ns} Not significant, * and ** significant at 1% and 5% probablity level.

Table 2. *Mean comparison of purple nutsedge density reduction percentage after indaziflam, trifloxysulfuron sodium+ametryn, 2,4-D+MCPA and 2,4-D+MCPA+metribuzin application until 90 days after spraying.*

Treatment	Purple nutsedge density reduction (%)					
	90 DAT	**90 DAT**	**75 DAT**	**60 DAT**	**45 DAT**	**30 DAT**
Indaziflam (50 g ai ha^{-1})	62.46c	66.18c	69.64c	75.89b	96.42a	100a
Indaziflam (75 g ai ha^{-1})	82.81b	85.09b	88.75b	100a	100a	100a
Trifloxysulfuron sodium+ametryn	51.70d	49.49d	55.66d	62.35c	78.98b	80.12b
2,4-D+MCPA	25.26f	24.36f	32.32f	42.39d	42.71d	51.10c
2,4-D+MCPA+metribuzin	40.79e	36.75e	57.42e	45.21c	52.86c	57.83c
Weeding	100a	100a	100a	100a	100a	100a

Table 2. *Continued.*

Treatment	Purple nutsedge dry weight reduction (%)					
	15 DAT	**75 DAT**	**60 DAT**	**45 DAT**	**30 DAT**	**15 DAT**
Indaziflam (50 g ai ha^{-1})	100a	66.39c	70.51b	96.31a	100a	100a
Indaziflam (75 g ai ha^{-1})	100a	87.30b	100a	100a	100a	100a
Trifloxysulfuron sodium+ametryn	82.86b	57.26d	67.57b	81.27b	87.35b	89.86b
2,4-D+MCPA	64.71c	30.39f	42.10d	42.23d	42.23d	67.57d
2,4-D+MCPA+metribuzin	60.96c	41.32e	48.23c	66.57c	66.57c	77.43c
Weeding	100a	100a	100a	100a	100a	100a

Similar letters in each column indicate no significant difference based on the least significant difference (LSD) test (P≤0.01).
Abbreviation: DAT, days after treatment.

3.1. Traits Measured in Sugarcane

Quantitative traits that can be measured in sugarcane include stem length, internode length and diameter, and stem weight. Also, the quality attributes measured included the degree of purity of syrup, sucrose and extractable white sugar, which is explained below.

3.2. Quantitative Traits Measured

The results of the data variance analysis table (Table 3) showed that the effect of the applied treatments on the length of the stalk, the diameter of the middle internode, the length of the middle internode and the weight of the sugarcane stalk were significant. Stem yield is affected by stem height, density, and stem diameter, and the most influencing trait on stem yield is stem diameter, which is also significant due to the increase in stem diameter due to the applied treatments (P≤0.01). As can be seen in Figure 1, after weeding treatment, the best treatment in terms of stem length (241.44 cm), middle internode diameter (1.83 cm), middle internode length (14.5) and stem weight (120 tons per hectare) of sugarcane belonging to the indaziflam treatment with the amount of 75 grams of effective substance per hectare, no significant difference was observed regarding the length of the stem and the length of the middle internode with the weeding treatment. By comparing two treatments of indaziflam with the amount of 50 and 75 grams of effective substance per hectare, no significant difference was observed between the two treatments in the measured traits, although the amount of traits measured in the treatment of indaziflam with 75 grams of effective substance per hectare with a slight difference from the treatment of indaziflam with the amount of 50 The gram of effective material per hectare was more. The most effective treatment after indaziflam treatments, trifloxysulfuron sodium + amtrin treatment with stem length (225 cm), stem weight (113.2 tons per hectare), internode diameter (1.76 cm) and internode length (13.9) cm) was a more efficient treatment compared to Tufordi + MCPA and Tufordi + MCPA + Metribiozin. By comparing the two treatments Tufordi + MCPA and Tufordi + MCPA + metribiozin, it was observed that the treatment of mixing two herbicides Tufordi + MCPA + Metribiozin was a better treatment than Tufordi + MCPA. So, except for the middle internode diameter trait, the difference between these two treatments was significant (P≤0.01) in other traits.

Table 3. *Analysis of variance (mean squares) of quantitative and qualitative of sugarcane characteristics.*

Source of variations	Degree of freedom	Stem length	The middle internode length	Stem weight	The middle of internode diameter	Purity	Sucrose	Recoverable sugar
Replication	3	71.37 ^{ns}	0.08^{ns}	0.004^{ns}	0.01^{ns}	4.83^{ns}	1.46^{ns}	0.91^{ns}
Treatment	6	16652.24^{**}	0.11^{**}	0.07^{**}	0.011^{**}	126.14^{**}	11.51^{**}	8.79^{**}
Error	18	32.39	0.09	0.006	0.005	6.42	0.38	0.24
Coefficient of variances (%)	-	3.96	2.19	13.84	3.76	8.16	4.29	4.85

^{ns} Non significant, * and ** significant at 1% and 5% probablity level.

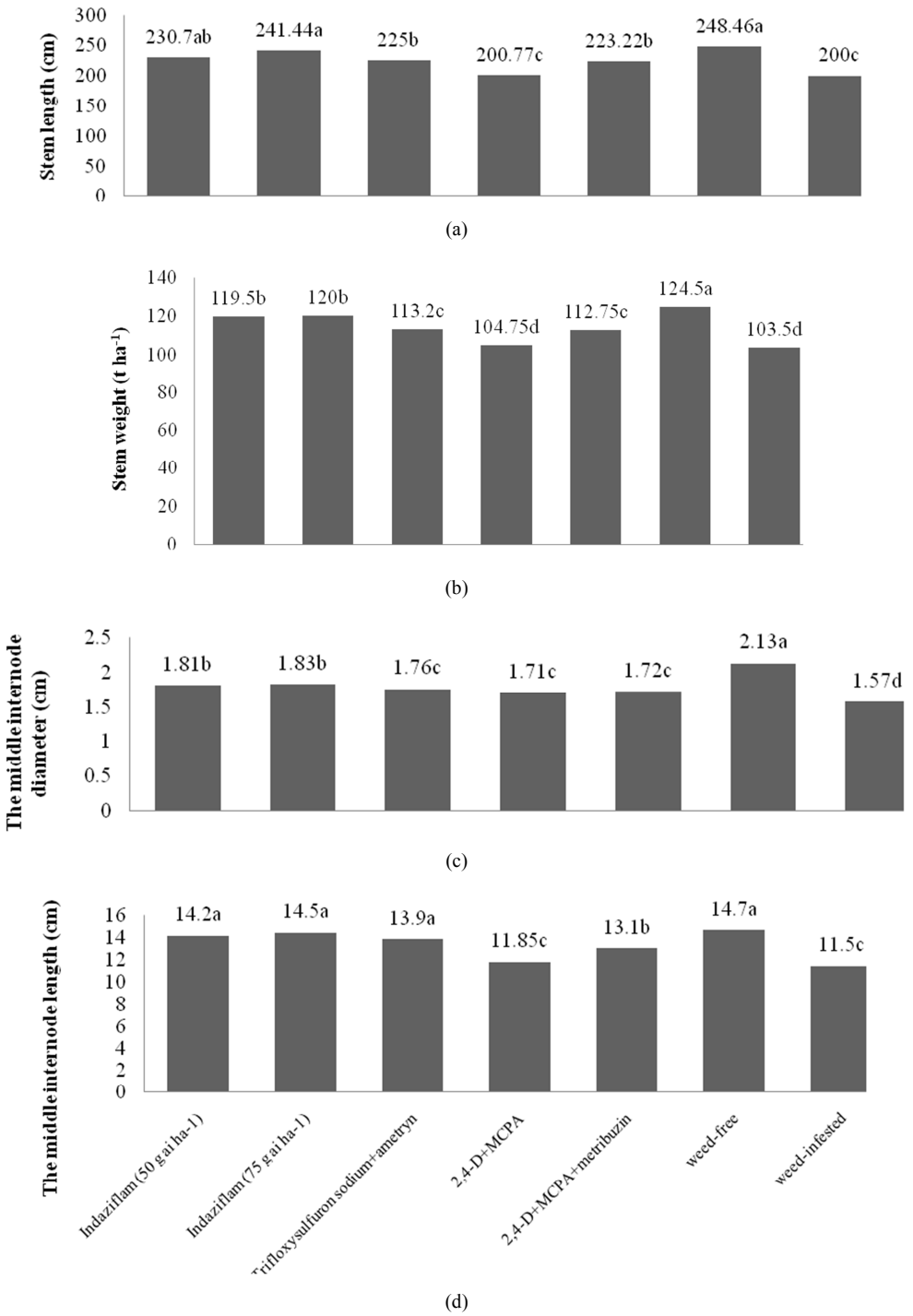

Figure 1. *Effect of herbicide treatments on stem length (a), stem weight (b), the middle internode diameter (c) and the middle internode length (d) of sugarcane.*

In an experiment comparing trifloxysulfuron sodium + amethrin with herbicides including tofordi, glyphosate and the combination of tofordi with amethrin and metribyozin along with Moyan on purple oyarsalam in sugarcane, the best treatment in terms of controlling purple oyarsalam is trifloxysulfuron sodium + amethrin at the rate of 2 kg per hectare was introduced [14]. Post-emergent herbicides need to be quickly absorbed and transferred to the meristem areas, including bulbs, rhizomes and tubers, for successful control of Oyarsalam. In an experiment on the absorption, transport and metabolism of the herbicide CGA-362622 as a foliar application on Oyarsalam, it was observed that less than 53% of the herbicide was absorbed after 96 hours, and a large amount of this amount was absorbed before 24 hours after application. [19]. The poor efficiency of post-emergence herbicides such as sulfentrazone on Oyarsalam is due to the presence of a relatively large amount of wax on the surface of the leaves of this plant, which can be the limiting factor for foliar absorption of the herbicide compared to other weeds that do not have a wax layer [19]. According to the better

effect of the mixture of Tu-Fordi + MCPA + Metribiozin compared to Tu, For-D + MCPA in the present experiment, this effect can be attributed to the activity of Metribiozin sprayed on the soil and its effect through So, in an experiment, the application of metribiozin in the middle of the rows to control Oyarsalam in sweet pepper led to an increase in yield by 10% compared to the untreated control [9].

In an experiment to compare the post-emergence and pre-emergence application of a number of herbicides, including halosulfuron and sulfentrazone, it was observed that the pre-emergence application of halosulfuron and sulfentrazone was at the rate of 71.6 and 350 grams of the effective substance per hectare of purple and yellow Oyarsalam 7 weeks after application at the rate of 72 and 52, respectively. The percentage decreased. While the use of these two herbicides as a post-emergence controlled purple and yellow Oyarsalam 79 and 50%, respectively, 3 weeks after application [7]. A noteworthy point about the effectiveness of pre- and post-emergence treatments on Oyarsalam is the reduction of the effect of pre-emergence treatments over time, so that the density of Oyarsalam increases again. In this regard, the results have shown that after 10 weeks of halosulfuron and sulfentrazone, the control of Oyarsalam decreased from 72% to 38% and from 52% to 43%, respectively [7]. Therefore, in order to effectively control perennial weeds such as Oyarsalam, it is necessary to repeat spraying with post-emergence herbicides during the growing season.

3.3. Measured Quality Attributes

As can be seen in table 3, the factors of purity of syrup, percentage of soluble sucrose or bridge and extracted white sugar have all become significant at the statistical level of 1%, which indicates the proper absorption of food elements and the performance of sugar making operations in an optimal way. As can be seen in Table 4, comparing the applied herbicide treatments, the highest percentage of syrup purity, percentage of sucrose and white sugar extracted, respectively, with values of 83.30, 15.69 and 11.25 (tons per hectare) belong to the treatment of indaziflam with 75 grams of substance. It was effective per hectare, which had no significant differences with the control except for the percentage of sucrose in other cases. After that, the treatments of indaziflam with the amount of 50 grams of effective substance per hectare, trifloxysulfuron sodium + amtrin and to, fur-di + MCPA + metribiozin were ranked next. The lowest purity values of extracted syrup, bridge and white sugar were 77.82%, 12.30% and 8.17 tons per hectare, respectively, belonging to the contaminated control treatment. In the study of glyphosate as a ripening accelerator in sugarcane, it was reported that glyphosate application increased the Brix percentage and stem bridge percentage by 8.9 and 9.6 percent, respectively, compared to the control (Karmollachaab et al. [12]. 1.5 and 2 liters per hectare Also, the most extractable sugar (12.43%) was obtained from the foliar treatment of 1.5 liters of glyphosate [12].

Table 4. *Mean comparison of qualitative characteristics in sugarcane.*

Treatment	Purity (%)	Pol (% of juice)	Recoverable sugar (% of cane)
Indaziflam (75 g ai ha^{-1})	83.30b	15.69b	11.25b
Indaziflam (50 g ai ha^{-1})	81.75bc	14.59bc	10.23c
Trifloxysulfuron sodium + ametr*yn*	81.07bcd	14.35c	10.13c
2,4-D+MCPA	79.47cd	12.79de	8.82de
2,4-D+MCPA+metribuzin	80.32bcd	13.88cd	9.67cd
Weeding	86.82a	17.07a	12.61a
Weed infested	77.82d	12.30e	8.17e

Similar letters in each column indicate no significant difference based on the least significant difference (LSD) test ($P \leq 0.01$).

4. Conclusion

The most important goal of sugarcane cultivation is stalk production. The stalk yield in sugarcane cultivation consists of two components, one is the average weight of a single stalk and the other is the number of stalks per unit area. The weight of a single stem is also influenced by two important factors: length and diameter of the stem. In general, the potential of sugarcane to produce dry matter is greatly influenced by the length of the growth period, genetic potential, physiological characteristics, climatic conditions and the level of control of pests, diseases and weeds. In the current research, considering the centrality of controlling Oyarsalam by using common herbicides in the region and also comparing the efficiency of these herbicides with the new herbicide Indaziflam, it was observed that the mentioned herbicide is able to control Oyarsalam up to 90 days after spraying. However, regarding the effectiveness of the treatments on Oyarsalam, it should be noted that the reduction of the effect of these treatments is inevitable over time; So that the density of Oyarsalam will increase again due to the feature of asexual reproduction from the rhizome and tuber. Therefore, in order to effectively control perennial weeds such as Oyarsalam, it is necessary to repeat spraying with post-emergence herbicides during the growing season. On the other hand, due to the widespread use of herbicides in sugarcane fields in Khuzestan province and the occurrence of weed resistance to these herbicides, more attention should be paid to the variety of herbicides selected for use in terms of the place of action. Considering the small consumption of indaziflam per hectare compared to common sugarcane herbicides, this herbicide will be a suitable option for controlling seasonal weeds in sugarcane fields.

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