

Reduced rate of herbicides effects on the weed control in silage corn¹Akram Parniagan, ²Javad Khalili Mahalleh, ³Mohsen Roshdi¹Graduated student of Agronomy, Islamic Azad University, Khoy Branch, Iran²Department of Agronomy, Islamic Azad University, Khoy Branch, Iran³Department of Agronomy, Islamic Azad University, Khoy Branch, Iran

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ABSTRACT

Using chemical methods and herbicides less than commented, is needed in order to reduce expenses and for the health of the environment which in turn leads to the raise of production and output. To reach this goal, in 2010 farming year the field experiment in the form of random blocks with 11 treatments and three replication was carried out in Jolfa city (north-west of Iran) with the purpose of measuring herbicides reduced effects on weed control in silage corn single cross 704. In this experiment three herbicides (2,4-D, Forum sulforon and Niko sulforon) were used in the post-growing manner with suggested amounts of 50%, 75% and 100 percent. Eleven experimental treatment included 2,4-D herbicide with the percentages of 0.675, 0.506, and 0.337 kilogram of suggested effective matter in hectare and Niko sulforon with the amounts of 40%, 30% and 20% kilogram in hectare and Forum sulforon with amount of 0.225, 0.168 and 0.112 kilogram in hectare were in the experiment including two witness treatment included: with and without weeding. According to the corn grain's yield of different treatments the possibility exists that the herbicides be reduced within 75%. Herbicide treatments with 75% density could control with herbicides more than 63% of weeds. In the treatments of 75% and 100% of niko sulforon and forum sulforon application the best weed control obtained that hadn't significantly difference with hand weeding treatment. Totally the results of experiments showed that reduced herbicides could accompany environmental and economical advantages.

Key words: Weed, Herbicide, reduced rate, yield**Introduction**

Corn has an important place among plants, one of the problems concerning corn production is weeds [13]. *convonvulus arvensis*, *Amarantus retroflexus* L. and *chenopodium album* L. are among wide leaf weeds. Most fields in western and Eastern Azerbaijan are polluted by these weeds and they caused the lack of yield in corns. Weeds are a serious menace for farmers because they prevent water, light, and food from reaching to farming plants and reduce the crops. Herbicides are an important tool for controlling against weeds. The factor that makes the use of herbicides so common and stops weeds is effectiveness and effort for saving time and manpower. but unfortunately herbicide usage is too prevalent and is not equal to plants real needs [10]. Today weeds experts, due to environmental problems as well as daily increase in weeds resistance to prevalent applied herbicides, are looking for alternative methods to raise the management efficiency of weeds as well as reducing herbicide use. In this regard, using low-dosage Herbicides would be of great use. Even in different

cases this is proved that low-dosage Herbicides can control weeds and environmental issues will decrease thanks to this fact [5]. Also by using low-dosage Herbicides before pollination, the corn can well defeat weeds and make up for weeds damage and boost the operation [8]. Some of the Herbicides that used for controlling the weeds of corn are 2,4-D, Forum sulfron and Niko sulfron. Forum sulfron with trade mark (Equip22% SC) is a new generation of Sulphonil Urea group, which is one of post-growing Herbicides affecting wide leaf annual grasses and controlling them economically [1]. Niko Sulfron Herbicide with "Cruise" Trade mark is in Sulphonil urea group.

Niko Sulforon as a past growing Herbicide is able to control a vast range of weeds in corn (Anonymous 2006). Niko Sulfron decomposes in soil rapidly and is not endangered [2]. Sulphonil urea composition is among Aceto-hydroxy acid cynthetase (AHAS) or Acetolaytase cynthetase (ALS) Herbicides. Sulphonil urea is absorbed by roots, stems and leaves. These Herbicides are systematic and are taken in by phloem [14]. 2,4-D is a past growing Herbicide and is from phenoxy group that

Corresponding Authors

Dr. Javad Khalili Mahalleh, Department of Agronomy, Islamic Azad University, Khoy Branch, Iran.
Email: j_khalili_m@yahoo.com

have similar effects to Auxine Which were of great use for controlling wide corn leaf weeds[15]. A lot of research is carried about the reduction of Herbicide usage in order to decrease expenses or environmental effects and farmers are suggested to use reduced rate Herbicides.[9,13,16,7,12].

Bells *et al* [4] reported that using the Tralcoksidem Herbicide with 50% dosage could controlled *Avena fatua* population in barley field more than 80% . baghestani *et al* [2] reported some fundamental changes in weeds control process in several crops in different conditions by using different dosages. They reported that only by using 20% of herbicide dosage they could control more than 70% of weeds in farm. Blackshaw *et al* [5] evaluated different dosages of herbicides on *Avena fatua* and the grain yield of wheat. Their experiment result showed that there was few different between 100% and 75% of recommended dosage of herbicide but using herbicide in lower dose reduced wheat yield and under this condition the population of *Avena fatua* was high.

Based on the importance of Herbicide usage reduction, in weeds management, this experiment is carried out with the purpose of analyzing the effect of reduced rates in silage corns single cross 704 and under the condition of weeds competition.

Materials and methods

In order to analyze the effects of different amounts of herbicides, an experiment carried out in 2011 which was in a field located at 38 degree and 49 min North & 45 degree and 35 min East within the range of 12 km South west of Jolfa city in north-west of Iran the with 896 meters height above sea surface .This experiment carried out in a farm with the natural pollution to *Amrantsu retreflexus* , *Convolvus Arvensis* and *Chenopodium album* and performed in a loamy texture soil. The land providing in the mid of may month began by plowing and leveling, then provided the furrows with 75 cm distance. He corn seeds planted by 70000 plant per hectare density. In this research used three post emergence herbicide in the amount of 100%. 75% and 50% of recommended dosage included 2,4-D herbicide in three amount consider 0.675, 0.506 and 0.337 kilogram of effective material in herbicide compound, the Niko sulforon herbicide in three levels included 0.4, 0.3 and 0.2 kilogram effective material in herbicide compound and Foram sulforon Herbicide in tree amount of 0.225, 0.168 and 0.112 kilogram of effective matter. All treatment number was 11 treatment and experiment carried out by randomized bock design with three replications. Two treatments were not using any herbicide and they were hand weeding and control treatment (no weeding). The herbicides spraying performed in shinny weather at 14 July. Spraying performed by back pump poison spray with one descend. It's rate

was 187 lit per hectare and speed of 5 Km per hour and between the corn lines In this time the weeds had 3-5 leaf and the height of corn was 40 cm. the hand weeding time was as time as herbicide spraying. The sampling for measuring of herbicide using effect was one week after herbicide application and the biomass of weeds determined in farm and complete controlling of weed give 100 number and non control give 1 number. In each treatment some corn traits such as leaf dry weight, stem dry weight ear dry weight fresh fodder weight, dry matter weight and crude protein determined, the experimental data analyzed with MSTATC program and the means comparison by Duncan multiple test performed with this program so.

Results:

Leave dry weight:

The variance analysis of experimental data showed that using of various amount of herbicides had significantly effect on leave dry weight of corn (table 1) . The most leave dry weight with 333.4 gram per on square meter was in complete hand weeding treatment and the lowest leave dry weight was in no weeding treatment (control) that with 247.1 gram located in lowest statically group (table 2). In this research there wasn't significantly difference between Niko sulforon herbicide in using amount of 100% and 75% of recommended dosage and 2,4-D herbicide in 100% of recommended dosage in comparison with hand weeding treatment.(table 2).

Stem dry weight:

In this research there was significantly difference between various dosage of herbicide in on the stem dry weight (table 1). Result showed that hand weeding treatment with 787.5 gram in m² had the maximum stem weight the stem dry weight and the Niko sulforon and Foram sulforon by 100 & 75% density and 2,4-D by 100% density could be put at the same level of hand weeding treatment Although there was no meaning full differences between hand weeding treatment and Nichosulfuron and Foram sulforon herbicide treatment by (75 & 100%) density and 2,4-D by 100% density, but the results showed that the application of 75% density of Niko sulforon and Foram sulforon herbicides had the same efficiency on the hand weeding treatment.

Ear dry weight:

The ear dry weight affected by various amount of herbicides in this study (table 1).The most Ear dry weight was 898.6 gr/m² and obtained in hand weeding treatment and the fewer Ears dry weight with 681.1 gr/m² resulted in not application of

herbicides treatment (Table 2). the most reduced Ear dry weight percent observed in without control treatment (24.21%) and the less reduced Ear dry weight percent (12.72%) obtained of Nicosulfuron herbicide treatment by 100% of density rather than hand weeding treatment (table 2).Result showed that there wasn't any significantly difference between

using forom sulforon and niko sulforon in two 100% and 75% of using amount with complete hand weeding treatment. The 2.4.D herbicide in 100% application amount hadn't difference with hand weeding treatment so , and all mentioned treatment located in same statically groups(table 2).

Table 1: Variance analysis of experimental traits in silage corn.

Source of variation	Degree of freedom	Means of square					
		Leaf dry weight	Stem dry weight	Ear dry weight	Dry matter	Fresh fodder	Crude protein
Replication	2	20.484	35.641	1630.655	51635.318	4309.15	0.016
Herbicide	10	3194.617**	16128.403**	20005.467 [†]	1229781.077**	8559.211**	1.032**
Error	20	125.493	291.522	352.871	66733.674	6209.580	0.158
Correction factor(%)		3.67	2.37	2.31	3.64	4.21	5.19

** and * significant difference in 1% and 5%, respectively.

Table 2: Means comparison of leave dry weight, stem dry weight, ear dry weight, dry matter , fresh fodder yield, and crude protein percent in weed control treatments.

Treatment	Leave dry weight (gram/m ²)	Stem dry weight (gram/m ²)	Ear dry weight(gram/m ²)	Dry matter (gram/m ²)	Fresh fodder (gram/m ²)	Crude protein (%)
Hand weeding	333.4 a	787.5 a	898.6 a	2030 a	7700 a	8.53 a
Niko sulforon 100%	332.3 ab	784.3 a	897.4 a	2028 a	7679 a	8.06 ab
Niko solforon75%	329.3 ab	779.7 a	873.4 ab	2004 a	7614 a	7.97 ab
Niko solforon 50%	274.1 c	641.1 cd	743.3 d	1696 c	6446 c	7.24 cd
Foram solforon 100%	331.7 a	781.9 a	895.8 a	2009 a	7634 a	8.0 abc
Foram solforon 75%	328.3 ab	777.2 a	869.0 ab	1989 a	7559 a	7.91 abc
Foram solforon 50%	270.3 c	643.7 cd	734.4 d	1680 c	6384 c	7.30 bcd
2.4.D 100%	330.3 ab	777.7 a	854.3 b	2005 a	7687 a	7.97 ab
2.4.D.75%	310.5 b	718.9 b	787.9 c	1850 b	6976 b	7.55 bcd
2.4.D 50%	272.6 c	633.9 cd	734.2 d	1672 c	6354 c	7.22 d
No weeding	247.1 d	612.1 d	681.1 e	1627 c	6181 c	6.38 f

Dry matter:

Dry matter calculated with additional three yield components included stem weight, leaf weight and ear weight then the experimental data's analyzed. Variance analysis of dry mater data showed that herbicides in different consuming rate had significant effect on this trait (table 2). Comparing detained averages showed that by increasing herbicides application rate, the dry matter rate also increased. The high and low weight of dry matter rather than hand weeding treatment (1627, 2028 gram/m²) respectively obtained of not application and the application of 100% density of Niko sulforon herbicide treatment. Also the hand weeding treatment with 2040 gram/m² produced the maximum biomass but there wasn't any significant meaning by 100% and 75% application of two niko sulforon and foram sulforon herbicides and 100% application of 2.4.D herbicide (table 2) and all mentioned treatments had same effect on weed controlling in maize farm.

Fresh fodder:

Silage corn harvested when that shoots have above 65% moisture and grains are in the end of milk

stage condition. There or fresh fodder evaluating have a high importance in each researches.

In this experiment there was significantly difference between weed control treatments(table 1). the most and lowest fresh fodder rate with the means of 7700 and 6181 gram/m² obtained in fully hand weeding and non weed control treatment respectively (table 2). Result showed that there wasn't statistically difference between niko sulforon and foram solforon herbicides in 100% and 75% application rates by full weeding treatment. Application of 2.4.D herbicide in 100% of recommended amount hadn't difference with all five mentioned treatments. Application of herbicides in lower dose couldn't control the weeds and this levels produced lower fresh fodder in this research (table 2).

Crude protein:

Corn is one of the best plants for silage production there for crude protein percentage is one of the important traits that evaluated in this study. Application of different herbicides dosage had meaning full effect in 5 percent level on fresh matter weight (Table 1). The means compared showed that the most crude protein percent with 8.53% related to

fully hand weeding treatment, also hadn't significant difference by 100% and 75% application of two foram sulforon and niko sulforon herbicides. Application of 2,4-D herbicide in 100% Of consuming rate also hadn't statistically difference

with hand weeding treatment. The lowest crude protein rate obtained in non weed control treatment that with 6.38% located in lowest statistic group (table 2).

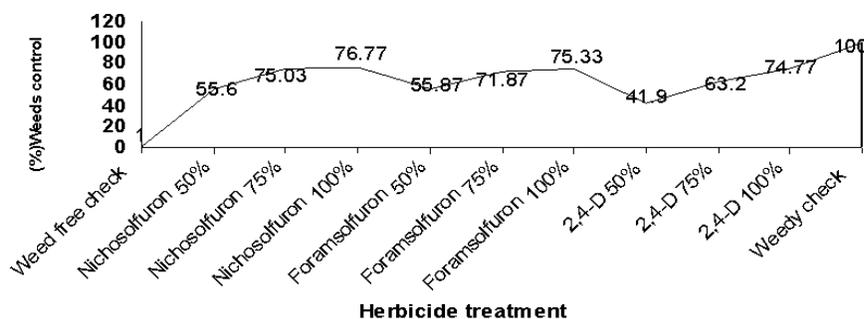


Fig. 1: Effect of reduced rates of herbicides on crude weeds control.

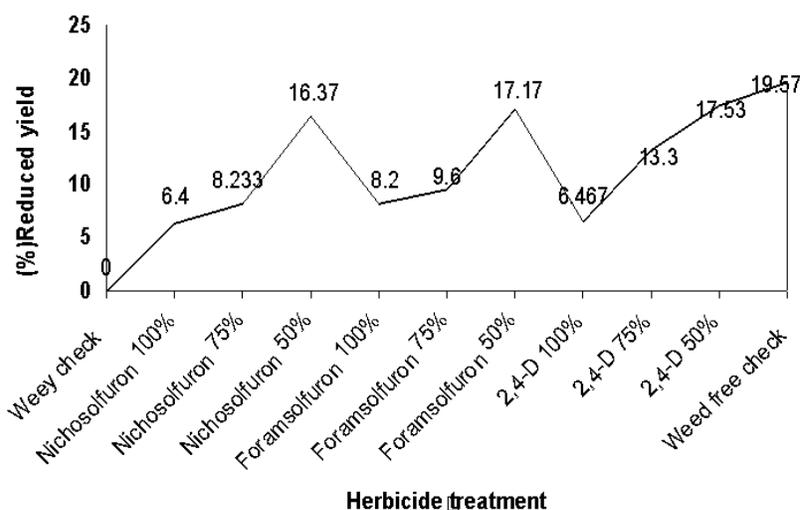


Fig. 2: Reduction percentage of corn yield with reduced rates of herbicides.

Weed's biomass:

In the fourth week after the last poisoning, it was observed that in each combination of herbicides, there was no meaning full differences between recommended and reduced rate from the total herbicides control point. The measurement of total dry weeds weight results showed that the high dry weight of them were seen in sample treatment without herbicide application or (without weeding). In poisoned herbicides among recommended rate, 100, 75% of recommended rate in Niko sulforon and Foram sulforon herbicides treatment, there was no meaning full difference. The application of 75% of recommended rate of Niko sulforon and Foram sulforon herbicides in each combination of herbicides averagely reduced the total rate of herbicides up to more than 75 and 71% rather than control treatment (no weeding treatment)(figure 1).

The result of this herbicide is that because 100% application of Niko sulforon and Foram sulforon herbicides had no difference with reduced rate of (75% of recommended rate), so it seems to be economically , natural pollution and human and animal safe nutrition, more beneficial. The 75% use of herbicides is cheaper. According to this it could be said that reduced rate of herbicides could reduce dry weeds weight per m² of each plot. It is important from herbicides numbers and reducing the yield decrease of farm view(figure 2).

Conclusion:

According to result of this research Niko sulforon reduced rate application up to 75% had the same efficiency that full hand weeding treatment or 100% application of Niko sulforon and 2,4-D herbicide in 100% application rate, therefore less

herbicide could be used for weed controlling and not only is it economical but also reduces natural pollutions. By considering the importance of leaf matters, they had high level of absorption and crude protein [11]. The high level of leaf weight in these experimental treatments had more importance. Among herbicides treatments Niko sulforon and Foram sulforon by 100 & 75% density and 2,4-D by 100% density could be put at the same level of hand weeding treatment. According to mentioned results, it seems that 75% density of Niko sulforon and Foram sulforon herbicides treatments not only reduce the stem dry weight percent, but also are economical rather than 100% herbicides density.

Ghezly *et al* [9] declared about reduced rate of Niko sulforon and Foram sulforon effect that Foram sulforon by 80% of recommended density and Niko sulforon by 75% of density could control the weeds satisfactorily. By considering difference between non weeding treatment and fully hand weeding and observation of not differences between Niko sulforon and Foram sulforon by (75 & 100%) density of herbicides treatment in above rate, it seems that the best treatment to achieve economically and naturally benefits is Niko sulforon and Foram sulforon herbicide treatment by 75% of density but 2,4-D herbicide efficiency only was in 100% of application rate and reduced rate of it hadn't enough efficiency for weed control in maize farm. All three herbicides by 100% density and Niko sulforon and Foram sulforon herbicides by 75% density put at the same level of hand weeding treatment. The results showed that 75% of Niko sulforon and Foram sulforon herbicides treatment not only reduce the dry matter weight percent, but also had less harmful effects in human and animal nutritious from remained poisons point and nature pollution. The result of this research showed that by the application of herbicides on time, the use of them can be reduced even up to recommended rate. It is the same as Delvin *et al* [6] and Mousavi [14] in researches in this field. Ear is an effective part in increasing plant dry weight so any factor which could increase.

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Comparing the results of silo corn reduced average percent showed that the high and low weight related to hand weedy and not weedy sample treatments respectively

In poisoned treatments in each combination, between 75% and 100% of recommended rate there

was no meaning full difference from reduced yield percent. The weeds existed in with out weedy sample treatment reduced the silo corn yield up to 19.57% rather than sample weedy.

Baghestani *et al* (2007) by the application of Foram sulforon and Niko sulforon herbicides up to reduced rate tad that the corn dry weight in reduced rate of herbicides treatment was equal to hand weedy treatment.

According to the results of this research to control all herbicides Niko sulforon and Foram sulforon herbicides by 75% of Suggested diversity are recommended. Because these herbicides have long time collective effects in Soil, so the application of them up to recommended rate could have many natural pollutions. Thus the reduced rate of them could be used instead of recommended rate.

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