



Effectiveness of mesotrion 60 g/l herbicide on weeds, growth and yield of sweet corn cultivars glutinous taste F1

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Abstract

Weed is one of the factors that cause low productivity of sweet corn. The presence of weeds in sweet corn areas can inhibit plant growth and affect sweet corn yields, which leads to competition for nutrients, water, and sunlight. This study aims to determine the effectiveness of the herbicide Mesotrione 60 g/l to control weeds in sweet corn plants. This research was conducted in a Bale Tatanen Faculty of Agriculture Padjadjaran University, Jatinangor, Sumedang Regency, West Java Province. The experimental design used was a randomized block design with seven treatments and four replications in order to obtain 28 experimental plots. The herbicide treatment of Mesotrione 60 g/l that tested was at a dose of 1,50 l/ha, 2,00 l/ha, 2,50 l/ha, 3,00 l/ha, 3,50 l/ha, manual weeding, and control. The results showed that the herbicide Mesotrion 60 g/l dose 2,00 l/ha - 3,00 l/ha effective and efficient in controlling total weeds in sweet corn cultivation up to 6 Weeks After Application, did not cause toxic symptoms in sweet corn plants, and increase the yield of corns.

Keywords: mesotrione, control weeds, herbicide, sweet corn

Introduction

One of the factors that hinders plant cultivation is the presence of weeds which causes competition with cultivated plants in obtaining nutrients, minerals, water, CO₂, light, and space to grow, thereby reducing the productivity of cultivated plants (Karya and Febrianti, 2021) [7]. According to Umiyati *et al.* (2019) Common weeds that grow in corn areas include. *Ageratum conyzoides*, while other weeds include *Richardia brasiliensis*, *Synedrella nodiflora*, *Biden pilosa*, *Cynodon dactylon*, *Cyperus kylingia*, *Imperata cylindrical*, and *Mimosa pudica*. Early research (2009) showed that yield losses to weeds averaged 10% (15% in the tropics) and common weeds reduced yields by up to 31% in maize. According to BPS (2022) [1] it shows that corn imports have increased every year, in 2021 imports were 1,185,516 tons, in 2022 they had increased to 1,756,787 tons.

Weed control using herbicides is in great demand by farmers because it is more efficient (Caesar *et al.*, 2012). One of the herbicides that can be used in the cultivation of sweet corn is a herbicide with the active ingredient Mesotrione. According to Hasanuddin (2013) [6] the workings of the herbicide, the active ingredient Mesotrione besides inhibiting pigments, also functions to inhibit the HPPD enzyme (p-hydroxy-phenylpyruvate dehydrogenase) which causes carotenoid pigments to not form, which can interfere with photosynthesis, also cause symptoms of bleaching on leaves, then weeds will dead.

According to Simatupang *et al.* (2020) [11] apart from the time and method of herbicide application, the effectiveness of the herbicide also depends on the dose of the herbicide. The dose of herbicide used can determine the effectiveness of an herbicide (Fuadi and Wicaksono., 2018) [4, 5]. so it is necessary to test the dose of herbicide with the active ingredient Mesotrione 60 g/l which can control weed growth and determine its effect on the growth and yield of the sweet corn cultivar Glutinous Taste F1.

Materials and methods

The experiment was carried out at Bale Tatanen, Faculty of Agriculture, Padjadjaran University, Jatinangor, Sumedang Regency, West Java Province, and the Weed Science Laboratory, Faculty of Agriculture, Padjadjaran University, Jatinangor, Sumedang, West Java. The experiment was carried out from June 2022 to August 2022.

The materials used were the herbicide Aleron 60 SC (b.a: Mesotrione 60 g/l), sweet corn seeds of the Glutinous Taste F1 cultivar, NPK Pearl fertilizer, Urea, KCl.

The tools used are semi-automatic back spray and T-jet nozzle, measuring cups, bamboo stakes, scissors, analytical scales, plastic buckets, tape measure, ruler, calipers, labels, ovens, envelopes, stationery and documentation tools (camera).

This experiment used the Randomized Block Design method which consisted of 7 treatments (Table 1) and each treatment was repeated 4 times, so there were 28 experimental plots. The experimental plot units were 4 m² x 6 m² with a spacing of 30 cm² x 60 cm². The distance between plot units is 50cm².

Observations included analysis of weed vegetation, dry weight of dominant weeds, other weeds, total weeds, phytotoxicity, plant height, stem diameter, cob length, cob diameter, and cob weight.

Table 1: Treatment Herbicide Mesotrione 60 g/l.

Treatment	Dosage (l/ha)
A. Herbicide Mesotrione 60 g/l	1,50
B. Herbicide Mesotrione 60 g/l	2,00
C. Herbicide Mesotrione 60 g/l	2,50
D. Herbicide Mesotrione 60 g/l	3,00
E. Herbicide Mesotrione 60 g/l	3,50
F. Manual Weeding	-
G. Control	-

Results and Discussion

Weight dry Total weeds

Table 2 on 3 WAA observations 3 WAA herbicide Mesotrione 60 g/l starting at a dose of 2.00 l/ha produced weed dry weights which were not significantly different from manual weeding and significantly different from controls. This shows that starting at a dose of 2.00 l/ha is effective in controlling total weeds. Observations 6 WAA

herbicide Mesotrione 60 g/l starting at a dose of 3.00 l/ha produced weed dry weights which were not significantly different from manual weeding and significantly different from the control. This shows that starting at a dose of 3.00 l/ha is effective in controlling total weeds. Research Wati *et al.* (2015) Mesotrione herbicide dose of 172 g ha⁻¹ caused leaves on weeds to dry out both broadleaf weeds, sedges and grass by 89.24%.

Table 2: Effect of Mesotrione 60 g/l Herbicide Application on Weed Dry Weight Total weeds.

Treatment	Dosage l/ha	Weighr dry (g)	
		3 WAA	6 WAA
A. (Herbicide Mesotrione 60 g/l)	1,50	15,59b	32,64d
B. (Herbicide Mesotrione 60 g/l)	2,00	12,73ab	26,22cd
C. (Herbicide Mesotrione 60 g/l)	2,50	11,47ab	22,22bc
D. (Herbicide Mesotrione 60 g/l)	3,00	10,05ab	19,70abc
E. (Herbicide Mesotrione 60 g/l)	3,50	7,98a	16,00ab
F. (Manual Weeding)	-	7,27a	12,17a
G. (Control)	-	44,90c	118,87e

According to Duncan's test, the mean value marked with the same letter in the same column is similar at the 5% level. WAA = Week After Application

Phytotoxicity

Table 3 shows that Mesotrione 60 g/l dose of 1.50 l/ha – 3.50 l/ha did not cause phytotoxicity in sweet corn plants. This is because the herbicide is selective so it does not cause poisoning to sweet corn plants but kills the target weeds. Sweet corn plants have enzymes in plants that function to detoxify chemicals that enter plants, and plants will rely on

biochemical defense mechanisms from incoming chemicals (xenobiotics) (Lolitasari *et al.*, 2019) ^[9]. These foreign compounds will be structurally related to plant secondary metabolism intermediates (especially flavonoids), the detoxification process will be successful when these phytotoxic chemicals are immediately metabolized to become less or not toxic at all (Cobb and Reade., 2010) ^[3].

Table 3: Observation of Phytotoxicity of Sweet corn.

Treatment	Dosage (l/ha)	Observation to-		
		1 week	2 week	3 week
A. (Herbicide Mesotrione 60 g/l)	1,50	0	0	0
B. (Herbicide Mesotrione 60 g/l)	2,00	0	0	0
C. (Herbicide Mesotrione 60 g/l)	2,50	0	0	0
D. (Herbicide Mesotrione 60 g/l)	3,00	0	0	0
E. (Herbicide Mesotrione 60 g/l)	3,50	0	0	0
F. (Manual Weeding)	-	0	0	0
G. (Control)				

0 = Not poisoned, 0-5% leaf shape or leaf colour and or abnormal plant growth. WAA = Week After Application

The cob length in table 4 shows that Mesotrione 60 g/l starting at a dose of 3.00 l/ha produced cob length which was not significantly different from manual weeding and significantly different from the control. This shows that starting at a dose of 3.00 l/ha effectively has a good effect on cob length. This is supported by the statement of Kefi *et al.* (2022) ^[2] cob length began to significantly decrease due to the influence of the presence of weeds.

The diameter of the cob in table 4 shows that Mesotrione 60 g/l starting at a dose of 2.00 l/ha produced ear length which was not significantly different from manual weeding and significantly different from the control. This shows that starting at a dose of 2.00 l/ha has an effective effect on cob diameter. Supported by the research of Kefi *et al.* (2022) ^[8]

which states that the higher the weed population there is a tendency to decrease the yield of sweet corn plants which will affect yields, one of which is the diameter of the cob. The cob weights in table 4 show that Mesotrione 60 g/l starting at a dose of 2.50 l/ha produced cob weights which were not significantly different from manual weeding and significantly different from the control. This shows that starting at a dose of 2.50 l/ha has an effective effect on cob weight. If weeds are not controlled during the critical period, namely the first 30 days of corn plant growth, it can reduce yields quite large, around 20-50% (Fuadi and Wicaksono., 2018) ^[4, 5]. According to Rahayu *et al.* (2003) ^[10] weed control is important because weeds compete with cultivated plants which results in a decrease in maize yields

Table 4: Effect of Application of Mesotrione 150 g/l Herbicide on Yield Components of Sweet Corn Plants.

Treatment	Dosage l/ha	Cob Length (cm)	Cob Diameter (mm)	Cob Weight (g)
A. (Herbicide Mesotrione 60 g/l)	1,50	24,79a	48,42b	275,77b
B. (Herbicide Mesotrione 60 g/l)	2,00	26,09b	50,86bc	291,05bc
C. (Herbicide Mesotrione 60 g/l)	2,50	26,73b	51,72bcd	307,12bcd
D. (Herbicide Mesotrione 60 g/l)	3,00	27,86c	53,60cd	321,15cd
E. (Herbicide Mesotrione 60 g/l)	3,50	28,52c	54,88d	332,27d
F. (Manual Weeding)	-	28,59c	54,54cd	332,55d
G. (Control)	-	23,71a	43,98a	197,7a

According to Duncan's test, the mean value marked with the same letter in the same column is similar at the 5% level.

Conclusion

herbicide Mesotrion 60 g/l dose 2,00 l/ha - 3,00 l/ha effective and efficient in controlling total weeds in sweet corn cultivation up to 6 Weeks After Application, did not cause toxic symptoms in sweet corn plants, and increase the yield of corns

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