

# *Ridolfia segetum* Moris (false fennel) response to different rates of application of Metsulfuron Methyl

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**Abstract**— High infestations of *Ridolfia segetum* can cause wheat crops yield reduction. The aim of this study is to investigate the effect of Metsulfuron Methyl on *R. segetum* infestation in a soft wheat crop. The experimental design was Randomized Complete Block Design (RCBD) with three replications. Each block contained 4 elementary plots, 3 plots of which were treated with three rates of application of Metsulfuron Methyl and one untreated control plot. Trial were conducted in Ouazzane region of Morocco in January 2018. Treatments were carried out with a knapsack sprayer with the nozzle delivering a 3 bar jet. A quadrant of 1m x 1m was used to calculate percentage of *R. segetum* density reduction and biomass reduction. *R. segetum* dry biomass were determined using an oven at 75 ° C for 48 hours. Then, weighed with a precision balance. Results showed that treatments with Metsulfuron Methyl at 6 g/ha and 9 g/ha gave the best control of *R. segetum* infestations recording respectively 92.5% and 94.6% of *R. segetum* density reduction and 92.7% and 94.6% of *R. segetum* dry biomass reduction. Metsulfuron Methyl at 3 g/ha recorded the lowest efficacies 61.9 and 48.8% respectively on *R. segetum* density reduction, and *R. segetum* dry biomass reduction.

**Keywords**— *Ridolfia segetum*, Metsulfuron Methyl, wheat, density, biomass.

## I. INTRODUCTION

Weeds are a serious problem in cereal crops in Morocco and severely affect production yields (Zimadahl & El Brahli, 1992; Boutahar, 1994; Taleb, 1996; Bouhache, 2007; Bouhache, 2017). *Ridolfia segetum* Moris (false fennel) belongs to Apiaceae botanical Family. It's an annual plant, hairless, fennel-smelling. Stem upright, usually 30 cm to 1 m high. Leaves divided into very thin segments (Tanji, 2005). Top leaves reduced. Inflorescence in umbels of 10 to 40 rays of 3 to 8 cm. Corolla with 5 yellow petals fringed. Ovoid seeds, 2 to 3 mm long and 0.5 to 1 mm wide, hairless, smooth, brown, 5 thin ribs (Tanji, 2005). Plant present in different region of Morocco usually on clay soils. Plant eaten by livestock especially before flowering (Tanji, 2005). Metsulfuron Methyl is an herbicide that belongs to the Sulfonylureas family. A small amount of active ingredient is used to kill weeds in cereal crops. It is an herbicide used to exterminate many annual or perennial broadleaf weeds (Ezzahiri & al., 2017). It is a systemic herbicide absorbed by root and leaves to inhibit cell division in the shoots and roots of the plant. It can be sprayed on leaves or soil and its action has some remanence. *Ridolfia segetum* become a serious problem in cereal fields in Ouazzan region of Morocco by reducing yields and making harvesting difficult. The aim of this

study is to compare the effect of three doses of Metsulfuron Methyl on the *Ridolfia segetum* infestation in a soft wheat crop in the Ouazzan region of Morocco.

## II. MATERIAL AND METHODS

A weeding trial was conducted in Ouazzane region of Morocco during 2017-2018 growing season. The experimental design was Randomized Complete Block Design (RCBD) with three replications. The distance between the blocks was 2 meters and the distance between plots was 1 meter. Each block contained 4 elementary plots, 3 plots of which were treated with the post-emergence herbicides tested (Table 1) and one untreated control plot. The size of the elementary plots was 2m x 5m (10 m<sup>2</sup>). Treatments was carried out on January 5, 2018 with a Knapsack herbicide sprayer with nozzle delivering a 3 bar jet. The spray volume per hectare is 200L. Treatments consist on three rates of application of Metsulfuron Methyl (Table 1). Observations were at 60 days after application of herbicides. Observations concerned Percentage of *R. segetum* density reduction and biomass reduction. *R. segetum* density reduction percentage=  $[R. segetum \text{ density in control plots} - R. segetum \text{ density in treated plots}] \times 100 / [R. segetum \text{ density in control plots}]$ , Calculation of the density at the

experimental level of the plot was made by a quadrant of 1m x 1m. *R. segetum* dry biomass reduction percentage= [R. segetum dry biomass weight in control plots – R. segetum dry biomass weight in treated plots] x 100 / [R. segetum dry biomass weight in control plots]. Calculation of dry *R. segetum* biomass were made by collecting *R. segetum* in each plot using a quadrant of 1m x 1m. Samples were dried in a drying oven at 75 ° C for 48 hours. Then, dry plant material in each plot were weighed with a precision balance. Statistical analyzes were performed with IBM SPSS Statistics, version 21.0 using the analysis of variance (ANOVA).The differences among treatment means was compared by Tukey’s test at  $P= 0.05$ .

Table 1: Applied herbicides in experimental site

Herbicide treatments	Herbicide active ingredient	rate of application (g/hectare)
Treatment 1	Metsulfuron Methyl	3 g/ha
Treatment 2	Metsulfuron Methyl	6 g/ha
Treatment 3	Metsulfuron Methyl	9 g/ha

### III. RESULTS AND DISCUSSION

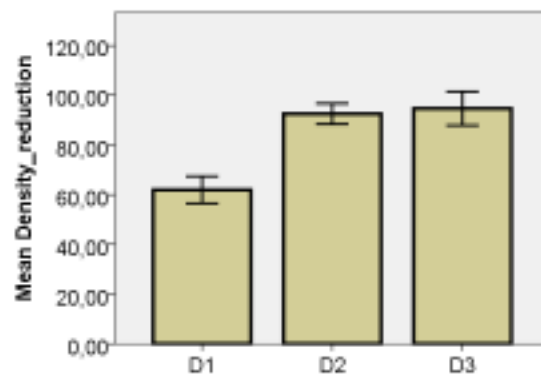
#### Effect on *R. segetum* density reduction

Statistical analysis revealed significant differences between treatments (Table 2). Results in Table 2 showed that the best *R. segetum* density reduction was obtained by Metsulfuron Methyl at 6 g/ha and 9 g/ha recording respectively 92.5% and 94.6% of *R. segetum* density reduction. Metsulfuron Methyl at 3 g/ha showed medium efficacies that did not exceed 61.9 % of *R. segetum* density reduction.

Table 2: Effect of treatments on *R. segetum* density reduction (%)

Treatments	<i>R. segetum</i> density reduction (%)
Metsulfuron Methyl at 3 g/ha	61.9 <sup>a</sup>
Metsulfuron Methyl at 6 g/ha	92.5 <sup>b</sup>
Metsulfuron Methyl at 9 g/ha	94.6 <sup>b</sup>
$P\alpha = 0.05$	<0.001

Significant differences within the same column and means followed by the same letter do not differ at  $P= 0.05$  according to Tukey’s test



D1 : Metsulfuron Methyl at 6 g/ha; D2 : Metsulfuron Methyl at 6 g/ha; D3 : Metsulfuron Methyl at 9 g/ha  
 Error Bars: 95% CI

Fig.1: Effect of treatments on *R. segetum* density reduction (%)

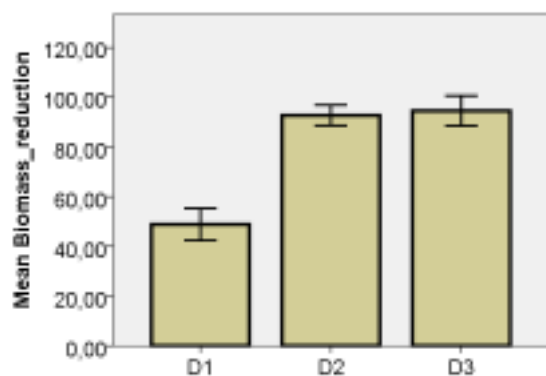
#### Effect on *R. segetum* dry biomass reduction

Statistical analysis revealed significant differences between treatments (Table 3). Data in Table 3 indicate that the best *R. segetum* dry biomass reduction was achieved by Metsulfuron Methyl at 6 g/ha and 9 g/ha recording respectively 92.7 % and 94.5% of *R. segetum* dry biomass reduction. Concerning the effect of Metsulfuron Methyl at 3 g/ha, results showed weak efficacies that did not exceed 48.8% of *R. segetum* dry biomass reduction. Suresh Kumar & al. (2011) reported that Tank mixture of clodinafop 60g/ha + metsulfuron methyl 4 g/ha and clodinafop 120 g/ha + metsulfuron methyl 8 g/ha with and without surfactant 0.2% provided excellent control of weeds in wheat crop.

Table 3: Effect of treatments on *R. segetum* dry biomass reduction (%)

Treatments	<i>R. segetum</i> density reduction (%)
Metsulfuron Methyl at 3 g/ha	48.8 <sup>a</sup>
Metsulfuron Methyl at 6 g/ha	92.7 <sup>b</sup>
Metsulfuron Methyl at 9 g/ha	94.5 <sup>b</sup>
$P\alpha = 0.05$	<0.001

Significant differences within the same column and means followed by the same letter do not differ at  $P= 0.05$  according to Tukey’s test



D1 : Metsulfuron Methyl at 6 g/ha; D2 : Metsulfuron Methyl at 6 g/ha; D3 : Metsulfuron Methyl at 9 g/ha  
Error Bars: 95% CI

Fig.2: Effect of treatments on *R. segetum* dry biomass reduction (%)

#### IV. CONCLUSION

This study has shown that the herbicide Metsulfuron Methyl at 6 g/ha and 9 g/ha gave the best control of *F. parviflora*. Metsulfuron Methyl at 3 g/ha showed weak to medium control of *F. parviflora*. Thus, Metsulfuron Methyl at 6 g/ha can be recommended to farmers in Ouazzane region when *R. segetum* infestation is dominant. This study should be completed with the assessment of Metsulfuron Methyl residues in soils and its phytotoxicity to crops grown in rotations.

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