

# Effect of Clodinafop-propargyl on *Phalaris paradoxa* L. (awned canary-grass) in wheat crop

Hajjaj B\*, El Oualkadi A\*

\*Regional Agricultural Research Center of Tangier, Morocco  
Corresponding author. E-mail: h\_badr15@yahoo.fr

**Abstract**— *Phalaris paradoxa* is problematic weed that decrease considerably wheat crop yields. The aim of this study is to investigate the effect of Clodinafop-propargyl on *Phalaris paradoxa* 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 Clodinafop-propargyl and one untreated control plot. Observations concerned Percentage of *Phalaris paradoxa* density reduction and biomass reduction. Results showed that treatments with Clodinafop-propargyl at 60 g/ha and 80 g/ha gave the best control of *Phalaris paradoxa* infestations recording respectively 96.2% and 98.5% of *Phalaris paradoxa* density reduction and 95.5% and 99.3% of *Phalaris paradoxa* dry biomass reduction. Clodinafop-propargyl at 40 g/ha recorded lower efficacies 77.1% and 82.3% respectively on *Phalaris paradoxa* density reduction, and *Phalaris paradoxa* dry biomass reduction.

**Keywords**— *Phalaris paradoxa*, Clodinafop-propargyl, wheat, density, biomass.

## I. INTRODUCTION

Weeds are a major problem on wheat production in Morocco as they compete on water, minerals and sunlight and make harvest operation more difficult (Zimadahl & El Brahli, 1992; Boutahar, 1994; Taleb, 1996; Bouhache, 2007; Bouhache, 2017). *Phalaris paradoxa* L. (awned canary-grass) belongs to *Poaceae* botanical Family. It is an annual plant. Upright 20 cm to 1.20 m high (Tanji, 2005). Leaves 10 to 20 cm long and 5 to 10 mm wide. Membrane ligules, 3 to 4 mm long. No auricles. Inflorescence is a compact and rough panicle, sometimes wrapped by the upper leaf, cylindrical, narrowed at the base, 3 to 10 cm long and 1 to 2 cm wide. Palms of the panicle made up of beams of 5 to 7 spikelets (Tanji, 2005). Central spikelets are fertiles, the others steriles. Oval seeds, hairless, shiny, 3 to 4 mm long and 1 to 2 mm wide without chip at the base, usually having 3 long lines on each side. Seedling is hairless, coiled prefoliation. First leaves 5 to 10 cm long and 1 to 2 mm wide. Membrane ligule, 1 to 4 mm. Seed determination makes it easier to recognize the seedling (Tanji, 2005). Plant lying on different types of soil and consumed by animals. Seeds are usually consumed by birds. Clodinafop-propargyl is an herbicide that belongs to Aryloxyphenoxy-propionate 'FOPs' family. It is a systemic herbicide absorbed by leaves to control grasses. It causes inhibition of acetyl CoA carboxylase (ACCase) which is an enzyme that catalyzes the fatty-acid synthesis (Ezzahiri & al., 2017). Clodinafop-propargyl inhibits the ACCase enzyme activity, thus blocking the production of

phospholipids necessary for synthesizing the lipid bilayer, which is indispensable for cell structure and function. *Phalaris paradoxa* decrease considerably cereal yields in Ouazzan region of Morocco. The aim of this study is to compare the effect of three doses of Clodinafop-propargyl on *Phalaris paradoxa* infestation in a soft wheat crop in the Ouazzan region of Morocco.

## II. MATERIAL AND METHODS

A weed control 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 2, 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 Clodinafop-propargyl (Table 1). Observations were at 60 days after application of herbicides. Observations concerned Percentage of *Phalaris paradoxa* density reduction and biomass reduction. *Phalaris paradoxa* density reduction percentage = [*Phalaris paradoxa* density in control plots – *Phalaris paradoxa* density in treated plots] x 100 / [*Phalaris paradoxa* density in control plots],

Calculation of the density at the experimental level of the plot was made by a quadrant of 1m x 1m. *Phalaris paradoxa* dry biomass reduction percentage= [*Phalaris paradoxa* dry biomass weight in control plots – *Phalaris paradoxa* dry biomass weight in treated plots] x 100 / [*Phalaris paradoxa* dry biomass weight in control plots]. Calculation of dry *Phalaris paradoxa* biomass were made by collecting *Phalaris paradoxa* 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	Clodinafop-propargyl	40 g/ha
Treatment 2	Clodinafop-propargyl	60 g/ha
Treatment 3	Clodinafop-propargyl	80 g/ha

### III. RESULTS AND DISCUSSION

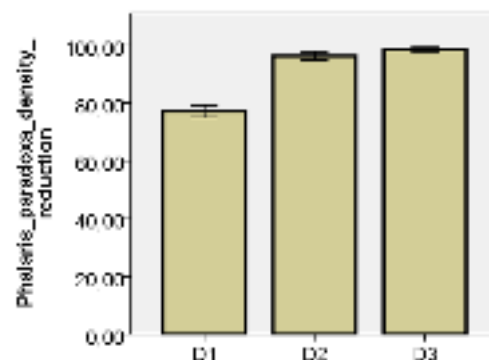
#### Effect on *Phalaris paradoxa* density reduction

Statistical analysis revealed significant differences between treatments (Table 2). Results in Table 2 showed that the best *Phalaris paradoxa* density reduction was obtained by Clodinafop-propargyl at 60 g/ha and 80 g/ha recording respectively 96.2% and 98.5% of *Phalaris paradoxa* density reduction. Clodinafop-propargyl at 40 g/ha showed lower efficacy recording 77.1 % of *Phalaris paradoxa* density reduction (fig. 1).

Table 2: Effect of treatments on *Phalaris paradoxa* density reduction (%)

Doses	<i>Phalaris paradoxa</i> density reduction
Clodinafop-propargyl at 40 g/ha	77.1 <sup>a</sup>
Clodinafop-propargyl at 60 g/ha	96.2 <sup>b</sup>
Clodinafop-propargyl at 80 g/ha	98.5 <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: Clodinafop-propargyl at 40 g/ha; D2: Clodinafop-propargyl at 60 g/ha; D3: Clodinafop-propargyl at 80 g/ha  
Error Bars: 95% CI

Fig.1: Effect of treatments on *Phalaris paradoxa* density reduction (%)

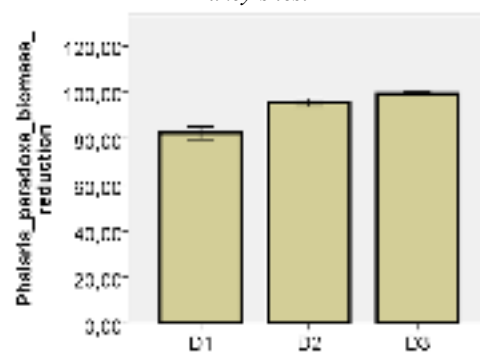
#### Effect on *Phalaris paradoxa* dry biomass reduction

Statistical analysis revealed significant differences between treatments (Table 3). Data in Table 3 indicate that the best *Phalaris paradoxa* dry biomass reduction was achieved by Clodinafop-propargyl at 60 g/ha and 80 g/ha recording respectively 95.5 % and 99.3% of *Phalaris paradoxa* dry biomass reduction. Concerning the effect of Clodinafop-propargyl at 40 g/ha, results showed lower efficacy recording 82.3% of *Phalaris paradoxa* dry biomass reduction (fig. 2).

Table 3: Effect of treatments on *Phalaris paradoxa* dry biomass reduction (%)

Doses	<i>Phalaris paradoxa</i> density reduction
Clodinafop-propargyl at 40 g/ha	82.3 <sup>a</sup>
Clodinafop-propargyl at 60 g/ha	95.5 <sup>b</sup>
Clodinafop-propargyl at 80 g/ha	99.3 <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: Clodinafop-propargyl at 40 g/ha; D2: Clodinafop-propargyl at 60 g/ha; D3: Clodinafop-propargyl at 80 g/ha  
Error Bars: 95% CI

Fig.2: Effect of treatments on *Phalaris paradoxa* dry biomass reduction (%)

#### IV. CONCLUSION

This study has shown that the herbicide Clodinafop-propargyl at 60 g/ha and 80 g/ha gave the best control of *Phalaris paradoxa*. Clodinafop-propargyl at 40 g/ha lower control of *Phalaris paradoxa*. Thus, Clodinafop-propargyl at 60 g/ha can be recommended to farmers in Ouazzane region when *Phalaris paradoxa* infestation is dominant.

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