THE EFFICACY OF ROUNDUP HERBICIDE APPLIED TO WHEAT STUBBLE, ON SOME PERENNIAL WEED SPECIES

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ABSTRACT

This paper presents the results of the investigations carried out during 1995-1999, in a three-year crop rotation initiated in 1972. The crops and treatment succession determined the modification of weed floristic composition. The treatment succession encouraged the control of some weeds (e.g. atrazine applied to maize crop decreased field infestation with *Raphanus raphanistrum, Sinapis arvensis, Matricaria inodora, Polygonum* sp.), and determined the dissemination of some species (e.g. 2.4 D applied to wheat and maize increased field infestation with *Elymus repens*). The treatment with Roundup (6 l/ha) of wheat stubble decreased crop infestation (perennial weeds) with 50% or even 100% where treatment succession controlled these species.

Key words: infestation degree, perennial weeds, Roundup herbicide.

INTRODUCTION

The results obtained in a stationary, long-term experiment have revealed the importance of crop rotation and treatments in weed control (Vlãduþu et al., 1986, 1988).

The perennial species are more resisting to herbicides then the annual ones, and from this reason, specific control measures are necessary.

The succession of some herbicides with close control spectrum, encourages the infestation of field with weeds which are not controlled during a long time period.

Thus, at maize and potato, the treatments with herbicides which belong to triazine group, encourage their infestation with *Cirsium arvense* and *Convolvulus arvensis* (Vlãduþu et al., 1986, 1988). In variants successively treated with herbicides which belong to phenylacetics group, a greater infestation with *Elymus repens* was noticed in comparison with the other variants (Fritea, 1998).

The research performed during 1995–1999 emphasized the possibility of controlling the perennial species *Elymus repens, Cirsium arvense* and *Convolvulus arvensis* by the application of Roundup herbicide on wheat stubble.

MATERIALS AND METHODS

During the experimentation period 1972–1999, by the succession of herbicides as part of a three-years crop rotation, a differentiation of weed infestation degree depending on treatments was possible to point out (Vlãduþu et al., 1986, 1988; Fritea, 1998).

Maintaining the variants with treatments as part of crop rotation, the treatment with Roundup of wheat stubble was introduced beginning with 1995. The treatment with Roundup was annualy applied to wheat plot and the treatment effect in the next three years was investigated.

During 1995–1999, the wheat plot was treated with Glean (10 g/ha), maintaining the plots by marking the treatments applied to maize and lupine.

The factors under investigation were:

A. <u>Treatments to lupine:</u>

a_1 - control (three manual and mechanized weedings);

a_2 – Promedon + Mecloran (4 + 5 kg, l/ha);

a_3 – Promedon + Gallant (4 + 3 kg, l/ha);

a_4 – Simadon + Mecloran + Afalon (1 + 5 + 2 kg/ha);

a_5 – Mecloran + Afalon (5 + 2 l, kg/ha);

a_6 – Afalon (4 kg/ha).

B. <u>Treatments to maize:</u>

b_6 – control (three manual and mecha-

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nized weedings);

b_7 – Diburom + Sansac (4 + 1 l/ha);

b_8 – Guardian + Sanolt combi (2 + 1 l/ha);

b_9 – Guardian + Onezin (2 + 3 l, kg/ha).

The variants treated with herbicides (b_7, b_8, b_9) were divided in two: mechanically unhoed and mechanically hoed.

C. <u>Treatments on wheat stubble:</u>

c_1 – untreated

c_2 – Roundup (6 l/ha).

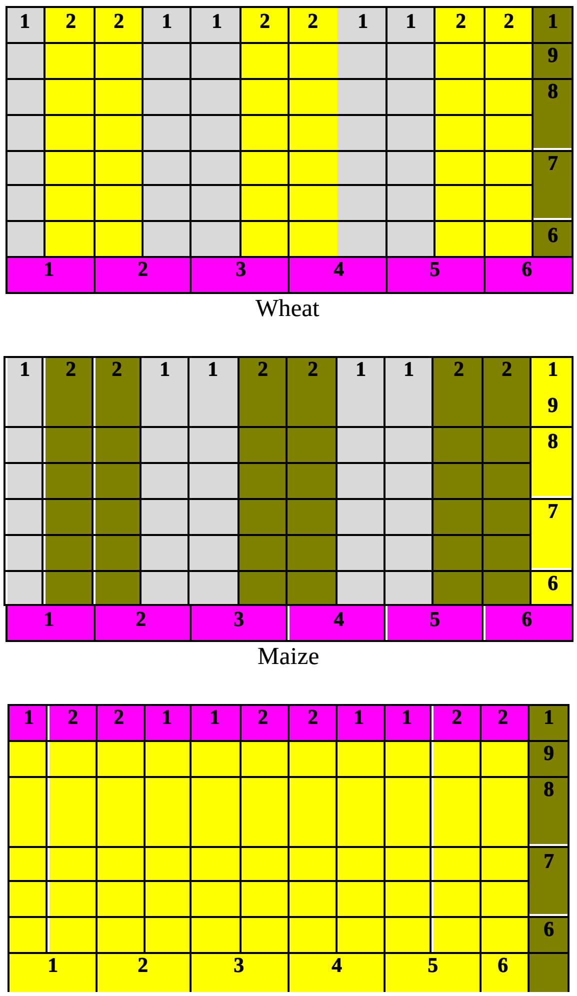

Figure 1. The experiment scheme (wheat, maize, lupine)

The treatment with Roundup on wheat stubble was performed at the beginning of September (45–60 days after harvesting). This interval was necessary for weed regeneration in order to have a greater leaf area to receive the herbicide.

The results presented refer only to maize crop as part of crop rotation: wheat–maize–lupine.

The investigation scheme is presented in figure 1.

RESULTS AND DISCUSSION

The mechanized and manual weeding of maize crop do not ensure the total control of *Cirsium arvense.*

At the mechanically hoed maize, the weed infestation limits range between 8 and 40 g/m^2 depending on the applied treatments to lupine (Figures 2 a, b). At maize, mechanically unhoed and treated with residual herbicides, the weed infestation degree with *Cirsium arvense* is at the highest level (30–129 g/m^2), no matter of treatments applied to lupine (Figure 2 a). The same thing is noticed in mechanically hoed variants, with the specification that the biggest quantity of *Cirsium arvense* (63 g/m^2) was in the variant in which the lupine was treated with Afalon and the maize with Guardian + Onezin (Figure 2 b).

In the case in which the wheat stubble was treated with Roundup, at unhoed as well as at mechanically hoed, the infestation with *Cirsium arvense* decreased bellow 20 g/m^2 (Figure 2 c, d). In the case of mechanically unhoed variants in maize treated with Guardian + Sanolt combi, in the four out of the six variants with treatments applied to lupine, *Cirsium arvense* species was registered in quantity of 0-19 g/m^2, while in mechanically hoed variants (lupine treated with Promedon + Mecloran and maize treated with Guardian + Sanolt combi or Guardian + Onezin), the infestation with the same species was of 18–21 g/m^2 (Figure 2 d).

The treatment with atrazine in usual rates in maize is inefficient in *Convolvulus arvensis* control (Fritea, 1998). In variants treated with Guardian + Onezin a weed biomass till 51 g/m^2 was determined (Figure 3 a). The control of *Convolvulus arvensis* species was more efficient in maize mechanically and manually hoed than in maize treated with triazine (Figure 3 a, b). Also, the treatment applied on vegetation with Sansac or Sanolt combi had a better effect than the triazine application, the limits of weed infestation with *Convolvulus arvensis* being between 10–15 g/m^2.

If in the variants without treatment on stubble a quantity of 51 g/m^2 *Convolvulus arvensis* biomass was determined, in the variants where the wheat stubble was treated with 6 l Roundup/ha, the quantity of this species ranged between 1–21 g/m^2, no matter if the maize was hoed or not (Figures 3 c and d). In this case,

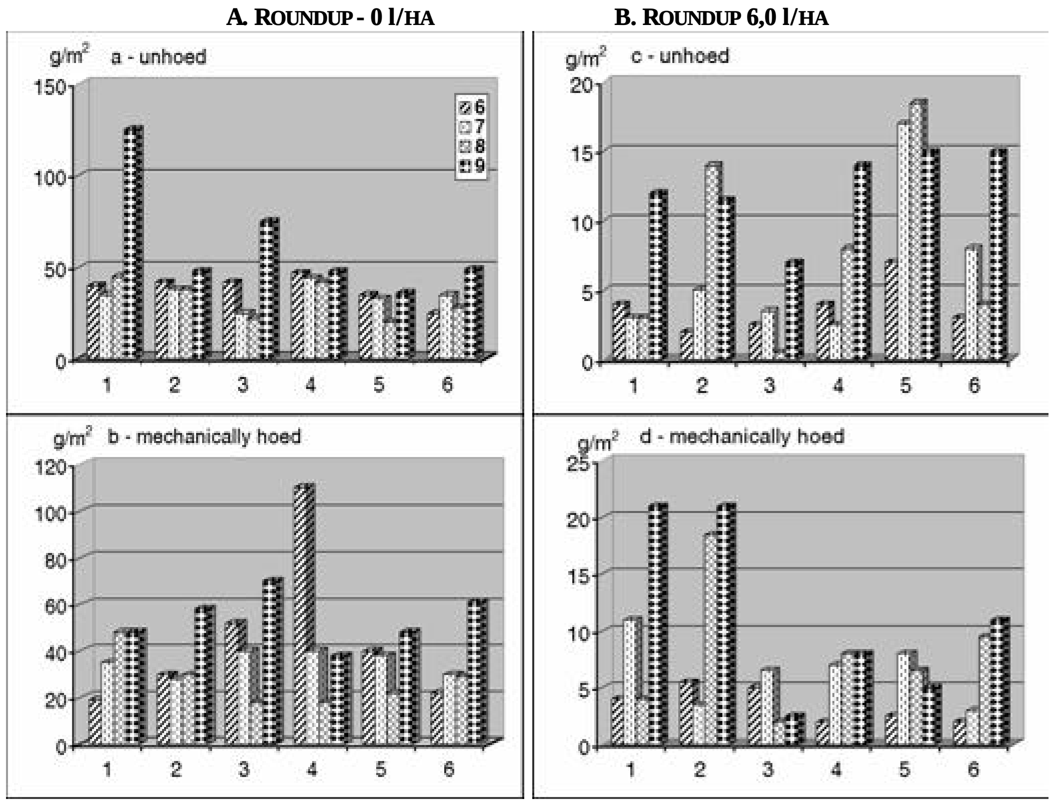

Figure 2. The influence of treatments on maize infestation with *Cirsium arvense*

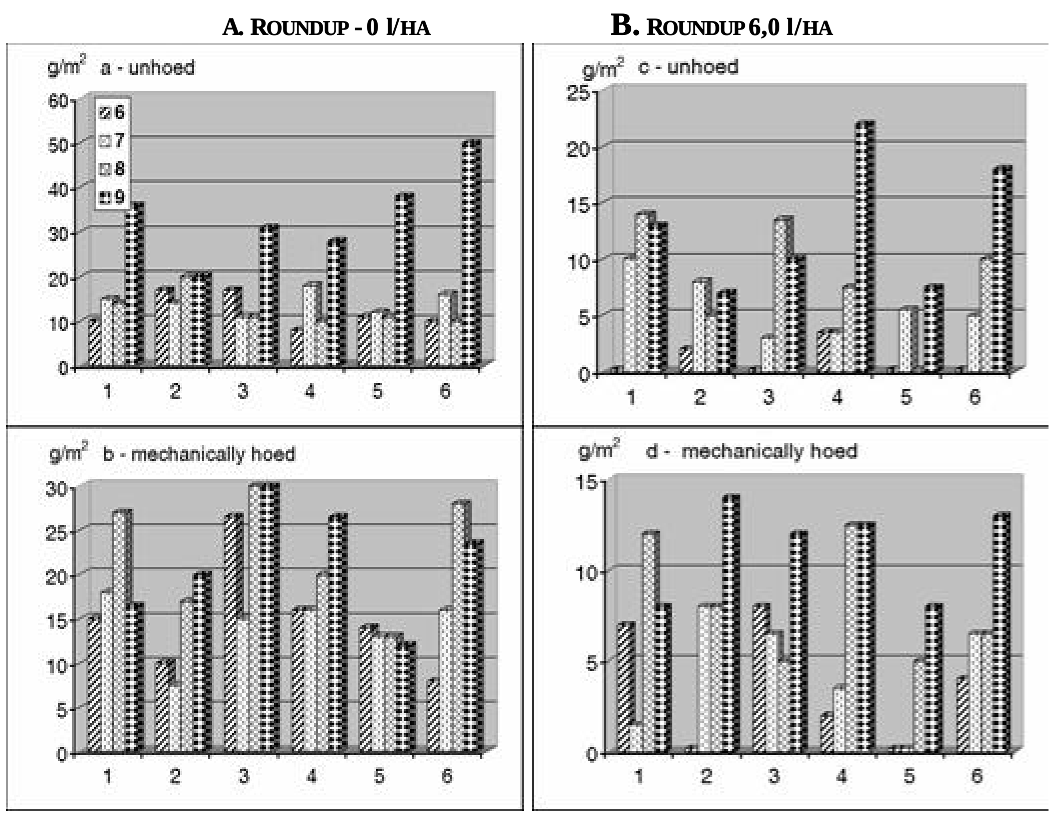

Figure 3. The influence of treatments on maize infestation with *Convolvulus arvensis*

too, a bigger quantity of *Convolvulus arvensis* was registered in variants of maize treated with triazine.

In variants with manually hoed maize and lupine treated with residual herbicides with low effect on *Elymus repens* species, the treatment

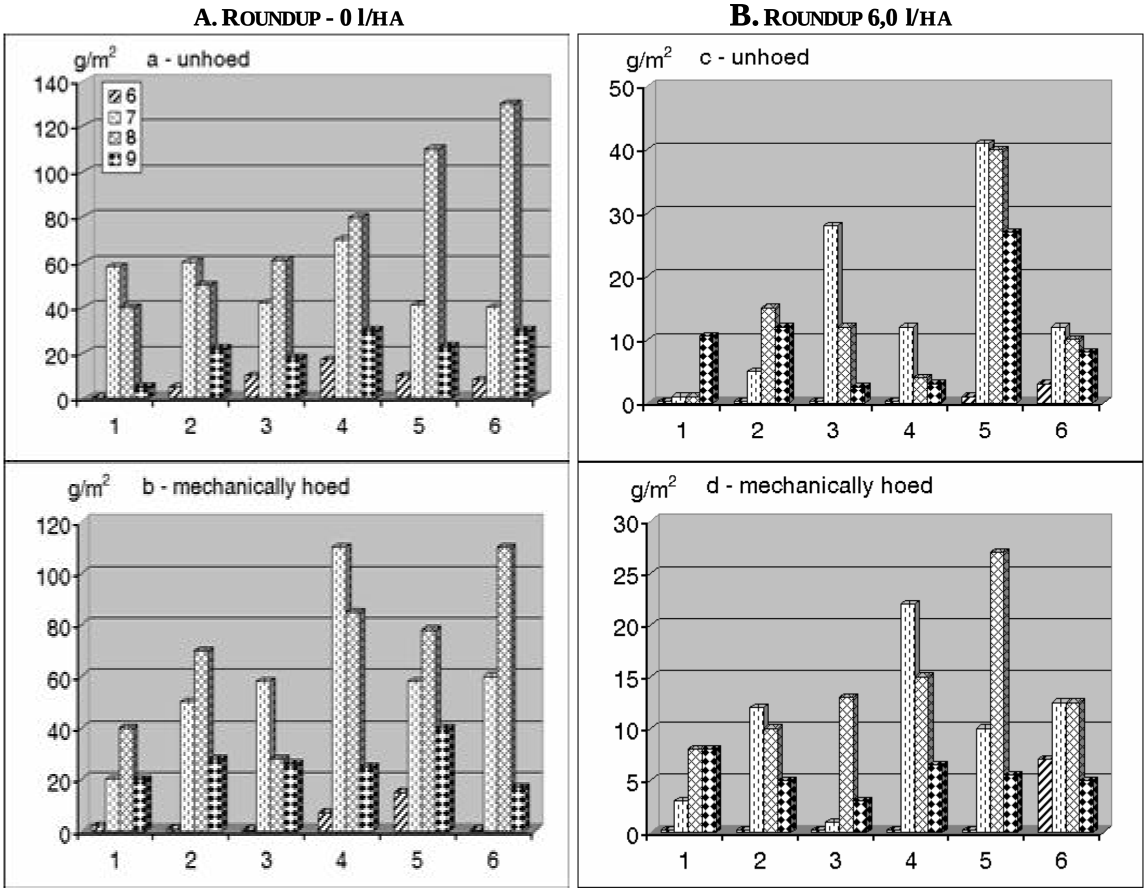

Figure 4. The influence of treatments on maize infestation with *Elymus repens*

with Roundup is necessary and efficient (Figure 4 d).

The treatments with residual herbicides without atrazine in maize and lupine associated with the inefficiency of the utilized herbicides in wheat crop on the *Elymus repens* species, determine the field infestation with this species.

At the maize sown after the manually and mechanically hoed lupine or treated with Gallant, the control of *Elymus repens* species can be achieved (Figure 4 b).

Elymus repens species from maize crop was efficiently controlled, independently of the treatment applied in both hoed and unhoed variants of lupine, in the maize variants hoed or treated with residual herbicides (Figure 4 a, b). In this case, the treatment of stubble with Roundup is not necessary.

In the case of unhoed maize variants, shown after wheat stubble treated with Roundup, the infestation level with *Elymus repens* significantly decreased. However, a higher infestation level was noticed where lupine was treated with Mechloran and Afalon (28–40 g *Elymus repens*/m^2) (Figure 4 c).

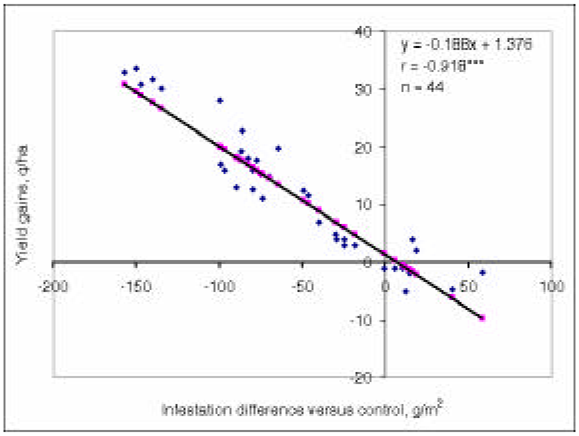

Figure 5 The maize yield regression depending on maize infestation with perennial species

The diminution of perennial weed quantity in comparison with the untreated control, determines yield gains of 35–40 q/ha in maize crop (Figure 5).

CONCLUSIONS

The application of Roundup herbicide on wheat stubble diminishes the maize infestation with *Cirsium arvense* from 30–129 g/m^2 to 20-54 g/m^2, the infestation limits are due to treatment succession in maize and lupine.

The treatments with herbicides as part of crop rotation have low efficiency in *Convolvulus arvensis* control, but the treatment with Roundup on wheat stubble diminishes the infestation with this species with 50%, depending on the treatment succession within the crop rotation. The postemergent treatments for dicots control applied to crops within rotation encourage the infestation with *Elymus repens*, in this case being useful the treatment with a specific herbicide or with Roundup on wheat stubble.

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