

THE WEED CONTROL STRATEGIES OF *APERA SPICA-VENTI* IN WHEAT CROPS

STRATEGII DE COMBATERE A SPECIEI *APERA SPICA - VENTI* DIN CULTURA DE GRÂU

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Abstract: Cultivating wheat in monoculture and practicing a short rotation determine proliferation of some specific weeds like as *Apera spica-venti* like as gravity in floristic structure and like as quantitative and numeric too.

The weeds dynamics in wheat monoculture crop and in two, three, four rotations show an increasing of total weeds inclusive of *Apera spica-venti* in monoculture and in short rotation (wheat - maize), where infestation degree is taken values by 72%, respective 65% after 23 years. Three and four year's rotation contributes at decreasing of total infestation and of specific weeds too.

Chemical control measures for *Apera spica-venti* are necessary in wheat monoculture and also in short rotation (wheat - maize) to, utilizing specific herbicides (Puma S, Attribut, Axial) associate with those for dicotyledonous (Rival Super Star, Peak) which will assure a 92 – 94% efficacy and very significant yield spores.

Rezumat: Cultivarea grâului în monocultură, precum și practicarea unor rotații scurte de tip cerealier determină proliferarea unor buruieni specifice cum este *Apera spica-venti*, atât ca pondere în structura floristică, cât și cantitativ numeric. Dinamica îmburuienării grâului cultivat în monocultură și în asolamente de doi, trei și patru ani indică o creștere accentuată a îmburuienării totale precum și cu *Apera spica-venti* în monocultură și în rotația de doi ani, unde gradul de infestare are valori de 72%, respectiv de 65% după 23 ani de experimentare. Rotațiile de trei și patru ani contribuie atât la reducerea infestării totale, cât și cu buruieni specifice.

Măsurile chimice de combatere a speciei *Apera spica-venti* se impun în monoculture de grâu și în rotația de 2 ani (grâu - porumb), utilizând erbicide specifice (Puma S, Attribut, Axial, etc.) asociate cu cele dicotiledoneice (Rival Super Star, Peak) care asigură o eficacitate de 92 – 94% și sporuri de producție foarte semnificative.

Key words: *Apera spica-venti*, infestation dynamics, gravity species, plant rotation, background, chemical control, specific herbicides

Cuvinte cheie: *Apera spica-venti*, dinamica infestării cu buruieni, ponderea speciei, rotația culturilor, agrofond, combatere chimică, erbicide specifice.

INTRODUCTION

In the last years very frequent is cultivating cereals following cereals more than two years, therefore inside of a 3 – 4 years succession; cereals represent 60 – 70% in crop structure. In this type of system with such a large participation of wheat in plant rotation and with monoculture practicability and specific herbicides utilization, favoured excessive multiplication of monocotyledonous weeds such as *Apera spica-venti*.

Apera spica-venti rise with priority in autumn but in the case of soft winter rise even in the spring. *Apera spica-venti* crossed well the winter and follows the vegetation alongside by winter cereals. The *Apera spica-venti* control is possible to be made only using an adequate rotation associate with herbicides treatment.

In long term field experiments with winter wheat in different types of plant rotation, only after 2 – 3 years yet, is remarked very big differences regarding structure and density of weeds and the monocotyledonous species became dominant.

The scientific research in this area, remarked at winter wheat a 2 – 3 times bigger

weed degree in the case of monoculture comparative with two, three and four years rotation, distinguish that the plant rotation can contribute to decreasing of the number of weeds in crops.

In this paper is presented the dynamics of weeds in winter wheat crop in long term field experiments with different types of plant rotation and different organic-mineral fertilizers levels inclusive chemical control of *Apera spica-venti*.

MATERIAL AND METHODS

The researches have been made in long term field experimental with plants rotation at Oradea set up in 1983, in the preluvosoil conditions having 2.3% humus content, 31.55% clay and 55 pH (H₂O). Was examined the infestation dynamics with *Apera spica-venti* and dicotyledonous weeds in wheat monoculture and in two years plant rotation (wheat - maize), three years rotation (pea - wheat - maize) and four years rotation (pea - wheat - maize - maize) and three fertilizers levels N₀P₀, N₁₂₀P₈₀, N₁₀₀P₈₀ + manure. The manure rates was applied differentiate - 10 t/ha annual at wheat in monoculture, 20 t/ha at two years, 30 t/ha at maize in three years rotation, 40 t/ha at maize in four years rotation.

The applied technologies were those usually for each crop, without using specific herbicides.

The weeds were counted in the spring and situation is presented on rotation cycles establishing the gravity of *Apera spica-venti* comparative with total weeds.

The researches regarding the chemical control of monocotyledonous and dicotyledonous weeds was made in monofactorial experiments set up using the Latin rectangle method, in four replications with 25 m² plot size in a 6 years monoculture. The treatments was effectuated in spring at rosette stage for dicotyledonous weeds and *Apera spica-venti* at 2-3 leaves stage to appears of first node .

Observations and determinations was effectuated regarding the selectivity at 7, 14, 28 days from treatments and herbicides efficacy at 7, 14 and 28 days, using EWRS scale for selectivity (note 1-without phytotoxicity symptoms note 9-85% plants destroyed) and efficacy was evaluated like as a control degree (%). The utilized herbicides were: Attribut (propoxycarbazone-sodium 70%), Axial (pinoxaden), Peak (prosulfuron 75%), Herbaflex (isoproturon 500g/l+beclufbutamid 85g/l), and Puma super (fenoxaprop-p-etil 75g/l).

RESULTS AND DISCUSSIONS

The analysis of evolution of weeds in winter wheat crops distinguish a high increasing of these in monoculture in all backgrounds but the phenomenon is visible, in two and three years rotation, too. Was point out the fact that after closing of first experimental cycle (1983-1986) appeared *Apera spica-venti* only in wheat monoculture, with 12-13% gravity of infestation degree arriving at 72-73% gravity after 23 years, respectively from 12-13 weeds /m² to 240-248 weeds /m² differentiate in function of utilized fertilization background.

Short term rotation (wheat-maize) also favoured a increasing of weeds number in time, as with *Apera spica-venti*, as with dicotyledonous.

From 21% gravity after the second experimental cycle *Apera spica-venti* became dominant with 63% gravity in the case of N₀P₀ background respective 65-67% in the case of fertilized background.

In three years plant rotation (pea-wheat-maize) using specific technologies lead to decreasing of infestation with weeds especially with *Apera spica-venti*, which have 4-6% gravity in N₀P₀ background after 12 years plant rotation, respective 9-10% gravity in fertilized backgrounds but without special control measures, because of increasing of weed seeds reserve, the gravity arrived to 28-31%.

In four year rotation (pea-wheat-maize-maize) the number of weeds after first cycle of rotation is much reduced – 18 weeds/m² in N₀P₀ background respective 32-53/m² in fertilized backgrounds with monoculture (126 weeds/m² in N₀P₀ and 130-137 weeds/m² in fertilized backgrounds). It is remarked that *Apera spica-venti* with only 1% gravity and only in the case of fertilized backgrounds after 12 years rotations but gravity is increasing in time arriving at 13-14% after 23 years. (figure 1a)

Analyzing the average number of *Apera spica-venti* after 23 years in monoculture and those three types of plant rotation, is find out that the total weeds number in average in those three backgrounds was reduced with 28,7% in two years rotation, with 63,1% in three years rotation and a 67,8% in four years rotation. (figure1b)

It is noticed that in the case of organic-mineral fertilized background where is increasing the weeds number comparative with unfertilized background, the weeds reducing ranged between 27,1% in two years rotation and 58,7-63,9% in three and four years plant rotations.

The role of plant rotation is very important in reducing of specific weed infestation as *Apera spica-venti* respective reducing of infestation is taking values between 39,1- 42,4% in two years rotations, between 88,1-89,1% in three years rotation, respective between 94,2-95,9% in four years rotation.

Wheat cropping in monoculture or in two years rotation (wheat-maize) determine proliferation of *Apera spica-venti* species, quantitative and like gravity in floristically structure too, increasing in the same time reserve of seeds in soil. The crops succession inside of plant rotation in which wheat revive after 3-4 years offer possibility to alternate, associate and complete of weeds control methods, contributing at weed “problem” reducing which require special control measures.

The total weeds number including *Apera spica-venti* decreased concomitant with increased of number and differentiate of crops inside of crop rotation, being registered the lowest values in four years rotation.

In four years rotation, herbicide application at wheat is not necessary in every year because crops alternate with specific technologies decreasing the number of weeds, especially of *Apera spica-venti*.

If is not used on adequate plant rotation the infestation with *Apera spica-venti* will increase making necessary utilization of some specific herbicides for control of these weed, associate with herbicides against dicotyledonous for simultaneous control, of annual and perennial dicotyledonous.

In 2005-2007 period was checked the biological action of some specific herbicides (Attribut, Axial, and Puma super, Herbaflex) post emergent applied in control of *Apera spica-venti* in a wheat monoculture. The infestation degree quantitative and numerical with *Apera spica-venti* was determined before of herbicides application.

The dominant weeds were *Apera spica-venti* with a density from 216 plant /m² to 288 plant/m² respective *Matricaria inodora* from 20 plants /m² to 48 plants /m².

At harvesting was determined the number of an uncontrolled plants respective the number weed ears. The main goal of the control of this species is the decreasing of weed seeds number from soil because the seed play a very important role in dynamics and regulation possibility of infestation. (Table 1)

The best efficiency in control of *Apera spica-venti* (95%) was realized utilizing herbicides Puma super (when the weeds ears are reduce with 9.8%) and herbicides Herbaflex, Attribut, Axial when efficacy is ranged between 90-94%, respective the number of weed ears an reduce with 89.9-95.1%.

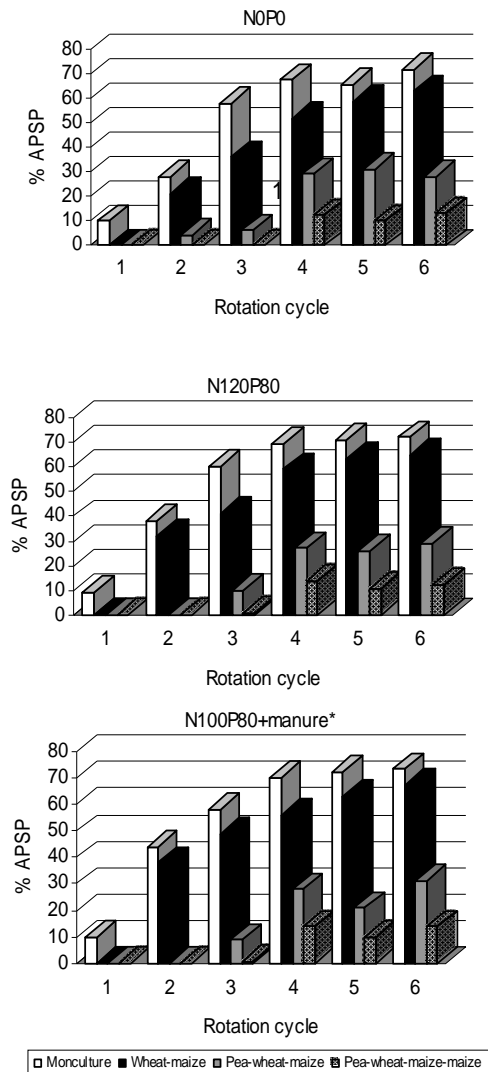


Figure 1a. The influence of rotation and fertilization on weed infestation in winter wheat with *Apera spica-venti*

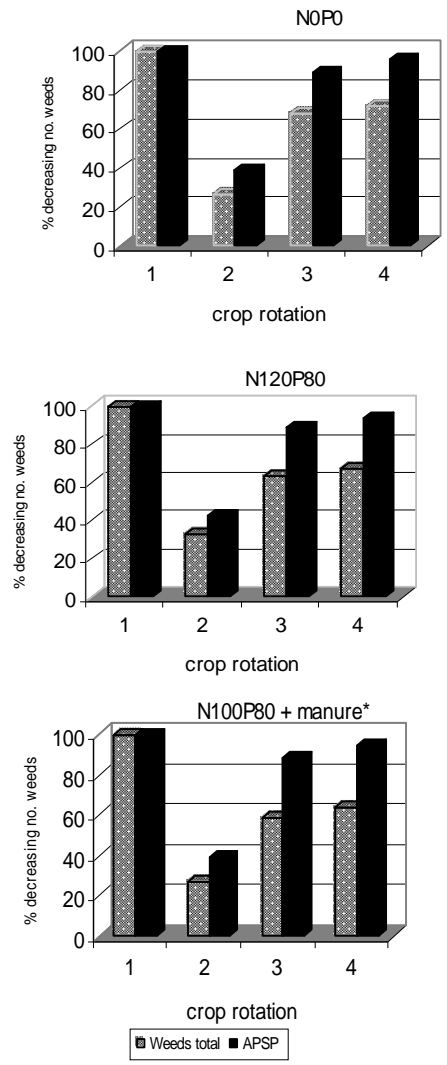


Figure 1b. The influence of rotation and fertilization on weed infestation in winter wheat

If these herbicides are associated with dicotyledonous herbicides (Peak, Rival super) the dicotyledonous weed will be control to with a 92-94% efficacy.

The wheat yield obtained is correlated with realized controlled degree. The highest yield spores (720-770 kg/ha) are obtained in treated variants with two associate herbicides (respective Axial+Peak, Puma super+ Rival super). Unilateral herbicide an application (Attribut, Axial, Puma super) lead to obtain of yield spores ranged between 280-330 kg/ha, insignificant statistic. (Table 2)

Table1.

Weed control in winter wheat (average from 3 years), Oradea 2005 – 2007

Herbicides	Rates l, kg/ha	Time of applic.	% weed control / no. of weeds/m ²										% of reducing the no. of ears
			APSP	MATIN	RAPRA	ANTAR	CHEAL	PAPRH	CIRAR	VIOAR	STEME	VERHE	
1. Attribut	0.1	post.	91 216	0 48	62 12	0 12	58 20	45 20	0 4	- -	- -	0 20	93.2
2. Axial	0.9	-/-	94 168	0 32	0 8	0 8	0 28	0 2	0 4	0 4	- -	0 -	95.1
3. Attribut + Peak	0.1+ 0.020	-/-	91 240	91 36	96 8	90 4	94 28	93 8	90 6	- -	- -	89 20	93.5
4. Axial + Aplus + Peak	0.8+0.5+0.020	-/-	94 288	92 56	95 4	92 12	95 8	92 8	91 4	- -	90 4	90 12	94.2
5. Herbaflex	3.0	-/-	90 240	72 28	90 4	70 8	82 12	86 4	0 8	88 4	90 12	88 20	89.9
6. Puma Super (std)	0.9	-/-	95 238	0 20	0 4	0 4	0 16	0 4	0 2	0 4	0 8	0 36	96.2
7. Puma S + Rival super std	0.9+0.020	-/-	95 234	96 32	98 12	93 4	95 12	93 12	93 8	31 4	- -	88 24	97.8
8. Control (no. of weeds/m ²)	-	-	224	28	4	-	16	2	4	1	-	16	852/m ²

Table2.

The various herbicide efficiency in controlling the weeds and the wheat yields, Oradea 2005 – 2007

Herbicides	Rates l, kg/ha	Selectivity (Scale 1-9)	Weed control %	Average yield		Yield increase kg/ha	Significance
				kg/ha	%		
1. Attribut	0.1	1	61	3120	110	280	
2. Axial	0.9	1	58	3150	111	310	
3. Attribut + Peak	0.1+ 0.020	1	92	3500	123	660	xx
4. Axial + Aplus + Peak	0.8+0.5+0.020	1	92	3560	125	720	xxx
5. Herbaflex	3.0	1.5	80	3440	121	600	x
6. Puma S (std)	0.9	1	65	3170	112	330	
7. Puma S + Rival super std	0.9+0.020	1	94	3610	127	770	xxx
8. Control (no. of weeds/m ²)	-	1	0	2840	100	-	

LSD_{5%} = 339 kg/ha, LSD_{1%} = 422 kg/ha, LSD_{0.1%} = 690 kg/ha

Chemical control utilization as a component of integrated control, have an important contribution in sustainable control methods of weeds from agricultural crops.

CONCLUSIONS

- The weeds evolution in wheat crops is in direct correlation with plant rotation and background utilized.

- If in 1983 *Apera spica-venti* was not present in wheat crops, the gravity of this species arrived after four years in wheat monoculture at 10% and after 23 years at 73% from total weeds.

- Practicing a short rotation – wheat-maize determines an increasing of weeds infestation with specific weeds and finally it is find 63-67% infestation with *Apera spica-venti*.

- Three and four years determine a general weed reduction comparative with monoculture in average with in those three backgrounds with 63,1% respective with 67,8%, the reduction being more emphasised in unfertilized backgrounds.

- The infestation reduction with *Apera spica-venti* in three years rotation is by 88, 7%, and respective 95% in four years rotation.

- In four years rotation chemical control measures application is not necessary in every year, because through crop alternation with specific technologies is arriving at a very low weeds level inclusive with *Apera spica-venti*.

- Chemical control methods application for *Apera spica-venti* concomitant with dicotyledonous weeds is necessary for wheat monoculture in short comy rotation utilizing specific herbicides (Puma super, Attribut, Axial) associate tank – mix with dicotyledonous herbicides in rosette phase for dicotyledonous weeds and in 2-4 leaves phase to one node for *Apera spica-venti*.

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