ON THE IMPACT OF THE PRE-EMERGENT CROP ON WEEDING IN SOY, WINTER WHEAT, SUNFLOWER, BARLEY, MAIZE, AND OAT CROPS

A. LĂZUREANU[1], G. CÂRCIU[1] , S. ALDA[1], Liana Maria ALDA[1]

[1] Universitatea de Ştiinţe Agricole şi Medicină Veterinară a Banatului , Timişoara
e-mail : lazureanuaurel@yahoo.com

In this study we aim at presenting the evolution of the weeding degree in six crops depending on the pre-emergent crops. In the experimental year 2006, the natural weeding state of each crop under study in monoculture had the following values: 80.10 weeds/m^2 in soy, 81.10 weeds/m^2 in winter wheat, 180.20 weeds/m^2 in maize, 93.00 weeds/m^2 in barley, 142.00 weeds/m^2 in sunflower, and 121.00 weeds/m^2 in spring oat. The impact of the pre-emergent crop results in a diminution of the weeding degree, as follows: 18.25-30.12% in soy, 20.92-28.68% in winter wheat, 20.16-31.17% in sunflower, 22.16-30.96% in barley, 21.45-29.43% in maize, and 16.73-25.75% in oat. The pre-emergent crop had un important influence on yield level in six crops, the productivity being in correlation with weeding degree and having the following values: 17,26-22,8 q/ha in soy, 35,3-42,96 q/ha in winter wheat, 20,48 -24,75 q/ha in sunflower, 32,40-38,88 q/ha in barley, 48,00-50,80 q/ha in maize, and 16,38-19,25 q/ha in oat.

***Key words**: natural weeding, weeding degree, crops, yield level.*

Of particular importance within crop rotation is the way in which crops succeed each other, i.e. the pre-emergent crop after which there is a certain crop. Setting each crop after the best pre-emergent crop develops optimal conditions for the maximum valorising of the yielding potential of a crop and soil [1]. The pre-emergent crop plays an important role influencing yield, soil features, weed, disease, and pest control, chemical composition and particularly yield quality [2]. Monitoring the effect of the pre-emergent crop on weeding, research we have carried out confirms the fact that weeding differs in the same crop depending on the pre-emergent crop [3].

MATERIAL AND METHODS

The experiments were organised at the Didactic Station in Timişoara, on a cambic, poorly gleyied chernozem with a humus content of 3.41%, normally supplied with nitrogen (0.18%), poorly supplied in mobile phosphorus (17.80 ppm) and with a high supply of assimilable potassium (187.6 ppm).In the fall of 2005, we sowed winter crops – winter wheat and winter barley – and in the spring of 2006 we sowed summer crops – oat, soy, sunflower, and maize. The area cultivated with straw cereals (winter

wheat, winter barley, and oat) is 2,987 m^2 (21.75 m x 137.35 m), each of the pre-emergent crops covering 498 m^2, with 4 replications. In the case of tiller crops (maize and sunflower), the area of each crop is 2,884 m^2 (21 m x 137.35 m), each pre-emergent crop covering 480 m^2, with 4 replications, while soy covers 2,966 m^2 (21.60 m x 137.35 m), each pre-emergent crop covering 494 m^2, with 4 replications[4].

RESULTATS AND DISCUSSIONS

In soy the number of weeds oscillated between 55.97 weeds/m^2 in sunflower and 65.48 weeds/m^2 in wheat. Weed control percentage is significantly influenced by the pre-emergent crop and ranged between 18.25% and 30.12%, respectively. The lowest number of weeds was in sunflower (*tab 1*).

Table 1

Impact of pre-emergent crop on weeding in monocultural soy, in 2006

Variant (pre-emergent crop)	Weeds/m^2	Weed control depending on the pre-emergent crop (%)
V_1 – Soy (monoculture)	80.10	0.00
V_2 – Wheat	65.48	18.25
V_6 – Barley	62.98	21.37
V_4 – Oat	62.12	22.45
V_5 – Maize	57.43	28.30
V_3 – Sunflower	55.97	30.12

Monocultural soy yield was 17.80 q/ha. The highest yields were in the variants in which the pre-emergent crops were grain maize and sunflower, i.e. 20.80 q/ha and 22.19q/ha, respectively. Straw cereals such as winter wheat and winter barley yielded 14.72% and 9.94% respectively more than the control (*tab 2*).

Table 2

Impact of the pre-emergent crop on monocultural soy, in 2006

Variant (pre-emergent crop)	Absolute yield (q/ha)	Relative yield (%)	Difference in yield (q/ha)	Significance
V_5 – Maize	22.80	128.09	+5.00	xxx
V_3 – Sunflower	22.19	124.66	+4.39	xxx
V_2 – Wheat	20.42	114.72	+2.62	x
V_4 – Barley	19.57	109.94	+1.77	-
V_1 – Soy (monoculture)	17.80	100.00	Mt.	-
V_6 – Oat	17.26	96.97	-0.54	-

$DL_{5\%}$= 2.19 q/ha $DL_{1\%}$= 3.04 q/ha $DL_{0.1\%}$= 4.19 q/ha

In winter wheat after determining the number of weeds/m^2, we found out that it oscillated between 57.84 weeds/m^2 in soy and 64.13 weeds/m^2 in winter barley. Weed control percentage was significantly influenced by the pre-emergent crop, and it oscillated between 20.92% and 28.68%, respectively. Weed control percentage in barley and oat was 20.92% and 21.90%, respectively. Tiller crops

ensure a more efficient weed control, with soy reaching a weed control of 28.68% (*tab.3*).

Table 3

Impact of pre-emergent crop on weeding in monocultural winter wheat, in 2006

Variant (pre-emergent crop)	Weeds/m^2	Weed control depending on the pre-emergent crop (%)
V_2 –Wheat (monoculture)	81.10	0.0
V_4 – Barley	64.13	20.92
V_6 – Oat	63.34	21.90
V_5 – Maize	61.90	23.67
V_3 – Sunflower	61.41	24.28
V_1 – Soy	57.84	28.68

Yield in monocultural winter wheat was 34.10 q/ha. The highest yield increases compared with the control were after soy and sunflower, i.e. 8.86 q/ha and 5.77 q/ha, respectively. After maize, a crop with high demands of water and nutrients, the increase in yield was 3.62 q/ha. Yield increases after summer oat and summer barley were insignificant (*tab.4*). Relative yield oscillated between 103.52% in barley and 125.98% in soy.

Table 4

Impact of the pre-emergent crop on monocultural winter wheat, in 2006

Variant (pre-emergent crop)	Absolute yield (q/ha)	Relative yield (%)	Difference in yield (q/ha)	Significance
V_1 – Soy	42.96	125.98	+8.86	XXX
V_3 – Sunflower	39.87	116.92	+5.77	XX
V_5 – Maize	37.72	110.62	+3.62	X
V_6 –Oat	36.08	105.81	+1.98	-
V_4 – Barley	35.30	103.52	+1.20	-
V_2–Wheat (monocult).	34.10	100.00	Mt.	-

$DL_{5\%}$= 3.51 q/ha $DL_{1\%}$= 4.87 q/ha $DL_{0.1\%}$= 6.72 q/ha

In sunflower the number of weeds oscillated between 97.74 weeds/m^2 in soy and 111.78 weeds/m^2 in winter wheat. The weed control percentage was significantly influenced by the pre-emergent crop and ranged between 20.16% and 31.17%, respectively. The lowest number of weeds was in pre-emergent soy (*tab 5*). The best pre-emergent crops for sunflower proved soy and winter wheat, with yields between 24.75 q/ha and 23.46 q/ha, respectively. After winter barley and grain maize, we got yield of 23.12 q/ha and 22.37 q/ha, respectively (*tab. 6*).

Table 5

Impact of pre-emergent crop on weeding in monocultural sunflower, in 2006

Variant (pre-emergent crop)	Weeds/m^2	Weed control depending on the pre-emergent crop (%)
V_3 – Sunflower (monoculture)	142.00	0.00
V_2 – Wheat	111.78	20.16
V_6 – Barley	111.50	21.48
V_4 – Oat	107.42	24.35
V_5 – Maize	101.67	28.40
V_1 – Soy	97.74	31.17

Table 6

Impact of the pre-emergent crop on monocultural sunflower, in 2006

Variant (pre-emergent crop)	Absolute yield (q/ha)	Relative yield (%)	Difference in yield (q/ha)	Significance
V_1 – Soy	24.75	133.06	+6.15	xxx
V_2 – Wheat	23.46	126.13	+4.86	xx
V_4 – Barley	23.12	124.30	+4.52	x
V_5 – Maize	22.37	120.27	+3.77	x
V_6 – Oat	20.48	110.11	+1.88	-
V_3–Sunflower(monoculture)	18.60	100.0	Mt.	-

$DL_{5\%}$= 2.56 q/ha $DL_{1\%}$= 3.54 q/ha $DL_{0.1\%}$= 4.88 q/ha

In winter barley: the number of weeds/m^2 depending on the pre-emergent crop, it oscillated between 64.21 weeds/m^2 in soy and 72.39 weeds/m^2 in barley. Weed control percentage is significantly influenced by the pre-emergent crop and it has values ranging between 22.16% and 30.96%, respectively. Tiller crops ensure a better weed control; thus, in soy, weed control reached 30.96% (*tab. 7*).

Table 7

Impact of pre-emergent crop on weeding in monocultural winter barley, in 2006

Variant (pre-emergent crop)	Weeds/m^2	Weed control depending on the pre-emergent crop (%)
V_4 – Barley (monoculture)	93.00	0.00
V_6 – Oat	72.39	22.16
V_2 – Wheat	70.19	24.53
V_3 – Sunflower	68.04	26.84
V_5 – Maize	64.80	30.32
V_1 – Soy	64.21	30.96

Depending on the pre-emergent crop winter barley yield oscillated between 32.40 q/ha (winter wheat) and 38.80 q/ha (soy). The variants with tiller pre-emergent crops (grain maize and sunflower) prove to be good pre-emergent crops and reach yields of 35.37 q/ha and 35.00 q/ha, respectively. Straw cereals result in yield increases of 2.22 q/ha and 1.48 q/ha, respectively (*tab. 8*).

Table 8

Impact of the pre-emergent crop on monocultural winter barley, in 2006

Variant (pre-emergent crop)	Absolute yield (q/ha)	Relative yield (%)	Difference in yield (q/ha)	Significance
V_1 – Soy	38.88	125.74	+7.96	xxx
V_5 – Maize	35.37	114.39	+4.45	xxx
V_3 – Sunflower	35.00	113.19	+4.08	xxx
V_6 – Oat	33.14	107.17	+2.22	x
V_2 – Wheat	32.40	104.78	+1.48	-
V_4– Barley (monoculture)	30.92	100.00	Mt.	-

$DL_{5\%}$= 1.88 q/ha $DL_{1\%}$= 2.57 q/ha $DL_{0.1\%}$= 3.21 q/ha

In maize: mapping (done in May 2006) the number of weeds oscillated between 127.17 weeds/m^2 in barley and 141.55 weeds/m^2 in soy. Weed control percentage is significantly influenced by the pre-emergent crop and it ranges between 21.45% and 29.43%, respectively. The lowest number of weeds was when straw cereals were pre-emergent crops. Thus, after summer oat, weed control percentage was 25.09%, while after winter cereals (wheat and barley) weed control percentage was 26.04 and 29.43%, respectively (*tab. 9*).

Table 9

Impact of pre-emergent crop on weeding in monocultural grain maize, in 2006

Variant (pre-emergent crop)	Weeds/m^2	Weed control depending on the pre-emergent crop (%)
V_5 – Maize (monoculture)	180.20	0.00
V_1 – Soy	141.55	21.45
V_3 – Sunflower	138.84	22.95
V_6 – Oat	134.99	25.09
V_2 – Wheat	133.28	26.04
V_4 – Barley	127.17	29.43

Monocultural grain maize yield was 46.10 q/ha. Yield increases compared with the monoculture were 1.90 q/ha and 4.70 q/ha, respectively. Soy proved to be the best pre-emergent crop with 4.70 q/ha more, followed by straw cereals: winter wheat (3.60 q/ha), winter barley (3.10 q/ha), and summer oat (2.40 q/ha). Sunflower resulted only in 1.90 q/ha yield increase (*tab.10*).

Table 10

Impact of the pre-emergent crop on monocultural grain maize, in 2006

Variant (pre-emergent crop)	Absolute yield (q/ha)	Relative yield (%)	Difference in yield (q/ha)	Significance
V_1 – Soy	50.80	110.20	+4.70	XX
V_2 –Wheat	49.70	107.81	+3.60	X
V_4 – Barley	49.20	106.72	+3.10	-
V_6 – Oat	48.50	105.21	+2.40	-
V_3 – Sunflower	48.00	104.12	+1.90	-
V_5 – Maize (monoculture)	46.10	100.00	Mt.	-

$DL_{5\%}$= 3.17 q/ha $DL_{1\%}$= 4.40 q/ha $DL_{0.1\%}$= 6.06 q/ha

In summer oat the number of weeds oscillated between 89.84 weeds/m^2 in soy and 100.76 weeds/m^2 in wheat. Weed control percentage is significantly influenced by the pre-emergent crop and ranges between 16.73% and 25.75%, respectively *(tab. 11*). The agricultural year 2006 proved unfavourable to summer oat because precipitations in April (78.80 mm) resulted in a delay of the sowing time. Yield in monoculture was 14.60 q/ha. After legumes (soy) yield reached 19.25 q/ha. Grain maize and sunflower crops allow yield increases of 3.86 q/ha and 3.77 q/ha, respectively, compared to monoculture. Winter barley and winter wheat have a medium value as pre-emergent crops, yield increases reaching 2.34 q/ha and 1.78 q/ha, respectively (*tab. 12*).

Table 11

Impact of pre-emergent crop on weeding in monocultural summer oat, in 2006

Variant (pre-emergent crop)	Weeds/m^2	Weed control depending on the pre-emergent crop (%)
V_6 – Oat (monoculture)	121.00	0.00
V_2 – Wheat	100.76	16.73
V_4 – Barley	98.07	18.95
V_5 – Maize	93.80	22.48
V_3 – Sunflower	91.25	24.59
V_1 – Soy	89.84	25.75

Table 12

Impact of the pre-emergent crop on monocultural summer oat, in 2006

Variant (pre-emergent crop)	Absolute yield (q/ha)	Relative yield (%)	Difference in yield (q/ha)	Significance
V_1 – Soy	19.25	131.85	+4.65	xxx
V_5 – Maize	18.46	126.44	+3.86	xx
V_3 – Sunflower	18.37	125.82	+3.77	xx
V_4 – Barley	16.94	116.03	+2.34	x
V_2 – Wheat	16.38	112.19	+1.78	-
V_6 – Oat (monoculture)	14.60	100.00	Mt.	-

$DL_{5\%}$= 2.30 q/ha $DL_{1\%}$= 3.19 q/ha $DL_{0.1\%}$= 4.40 q/ha

CONCLUSIONS

Results concerning the effect of the pre-emergent crop on weed control showed that in the studied crops weed control percentage varied depending on the pre-emergent crop, as follows: soy – 18.25-30.12%, wheat – 20.92-28.29%, sunflower – 20.16-31.17%, winter barley – 22.16-30.96%, grain maize – 21.45-29.43%, and oat – 16.73-25.75%.

Results concerning the effect of the pre-emergent crop on yield showed that in the studied crops it varied depending on the pre-emergent crop, as follows: soy – 17.26-22.80 q/ha, wheat – 34.10-42.96 q/ha, sunflower – 18.60-24.75 q/ha, winter barley – 30.92-38.88 q/ha, grain maize – 46.10-50.80 q/ha, and oat – 14.60-19.25 q/ha.

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