

ROLE OF RYE (*Secale cereale* L.) AS A CATCH-CROP IN ELEMENTAL TRANSPORT OF INTEGRATED CROP PRODUCTION

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Introduction

The system of integrated weed regulation applies aggregately the different protection methods towards the extension of effect of weed limitation. In practice the possibility of tilling and agrotechnics are integrated in most cases with the chemical weed regulation. The searches show (Derkensen et al. 1993; Shrestha et al. 2000; Percze, 2002) that the mechanical and agrotechnics protection methods have hidden reserves it is expedient take advantages in the crop cultivation to reduce the weight our environment. The effect of weed regulation of different tilling methods has been staying for decades in the centre of searches and authors reported about the effect of tilling on furrow-weed (Hume et al. 1991.; Swanton et al. 1999; Berzsenyi, 2000; Percze; 2002, Tuba, 2005). The crop rotation is an essential condition of integral crop cultivation and weed regulation systems but the importance of application of catch-crop can extend in the future. Aside from favourable impact of state ground (Whiteley és Dexter, 1982, Ujj 2004; Bencsik, 2004) remarkable is the weed limiting effects about that researcher from Hungary and from abroad different results publish. In Nelson et al. (1991) and Williams et al. (1998) opinions the eared catch-crops have purposely weed thinning effect and Teasdale (1993) mention the weed abridge effect of catch-crop too. Apply the tilling and the respective agrotechnics the get out amount of the chemical can be reduced so the weight of environment. In our research we wanted to know that the catch-crop, the rye (*Secale cereale* L.) what kind of forecrop value has and how influence the weediness.

Material and Method

The dissimilar tilling method, where we the rye as a catch-crop studied, we have tried the experiment in 2002 near Hatvan. The soil is lime chernozem, physical aspects is adobe, acidity a little bit acidic. The area of the experiment is $312 \times 150 \text{ m} = 4,68 \text{ ha}$. The experiment is four repeating, striped order. The measurement of parcels is $13 \times 75 \text{ m} = 975 \text{ m}^2$. Tillage variants:

- a₁: ploughing (26-30 cm)
- a₂: direct drilling
- a₃: french cultivation (12-16 cm)
- a₄: cultivation (16-20 cm)
- a₅: disking (16-20 cm)
- a₆: loosening + disking (40 + 16-20 cm)

I have chosen the year of 2004, because the area of the experiment would had been dimidiated in this year and only the first part of the parcels had been planted with rye. I could make comparison between open, covered areas and weed-state of the second plant (pea). In summer months of the year 2004 in the Hatvan area the precipitation was negative; it has hindered the start up of the pea and develop of the adaptable stand density after the gathering of rye as green forage. I have done the weed-analyses with the method of Balázs-Újvárosi, with some modification: the area was 1 m^2 because of the thick stand of rye (Németh 1994) and I have determined the weed cover with percentage estimation. I have done the surveying in every repeating by parcels 2-2 places (covered and open areas of catch-crop) and in the same way

by pea, too. By the stand of rye I have made the weed-surveying on 30. 03. 2004. by the pea on 25. 06- 2004.

Results and Conclusions

The rye has a good repressive ability; it is typical for autumn eared, special after the close of the stand. Whereas we can expect for the multitudinous start up of the summer yearling weed only after this Phenological phase of rye, we do not have to get ready for a strong T_{3-4} weed-start up by an optimal stand density autumn eared sowing. The most typical weeds are the winterer, early spring T_{1-2} species as well as the perennial plants. The area of the experiment was less infectious from the perennial plants. The weed-combination has corresponded to the aspect, which is typical for the season, by the first surveying were the T_{1-2} species dominant, by the second surveying (by pea) has the covering of T_4 species extended (Table 1-4). The occurrence of the perennial, reproductive-root plants (G_3) were not account (Table 1-4). The results of the early spring surveying show that out of the tillage variants ploughing (a_1), cultivation (a_4), and disking (a_5) were the best with regard to reduce the effect of weed-cover. The weediest experiment areas were direct drilling (a_2), french cultivation (a_3).

By open area, without rye, I have experienced the smallest weed-cover by ploughing (a_1), and disking (a_5); in case of the other tillage variants was not significant variant. The weediest experiment area was in this case the direct drilling (a_2) too (Table 1-2). Compared average early spring weed-cover the covered areas with open areas (catch-crop) we can say, that in the rye-sowing was the weediness smaller (2,67 %) and it is 68 % of the covered area by the open area (3,93%). The different does not seems significant because in the early spring time the presence of weeds is not significant. The rye-stand was in the stage before the full tightness and it reduce the difference between the areas. By four tillage variant (a_1 , a_2 , a_4 , a_6) the weed-cover value of the open areas passed with more than 40% the weediness of the same tillage method (it was covered by rye). It is worthy to place emphasis on the direct drilling, here was the weed-competition the biggest, but the rye was able to mitigate it with 42%.

Table 1. Results of weed-surveying by open area without catch-crop
Gödöllő, 31. 03. 2004.

Vegetable	Average weed-cover (%) by tillage variants					
	a_1	a_2	a_3	a_4	a_5	a_6
T_1	0,8	2,05	1,8	2,05	0,9	3,7
T_2	1	1,9	2,6	2,5	0,8	0
T_3	0,3	0	0	0	0	0,3
T_4	0,6	1,5	0,15	0,1	0,05	0
G_3	0	0	0	0,1	0	0
H_3	0	0,1	0,1	0,1	0	0,1
Total	2,7	5,55	4,65	4,85	1,75	4,1

Table 2. Results of weed-surveying with catch-crop
Gödöllő, 31. 03. 2004.

Vegetable	Average weed-cover (%)					
	a ₁	a ₂	a ₃	a ₄	a ₅	a ₆
T ₁	1,1	2,55	0,8	2,25	2,15	2,45
T ₂	0,35	0,25	1,05	0,65	0,15	0
T ₃	0	0,05	0,05	0	0	0
T ₄	0	0,2	1,4	0	0,3	0
G ₃	0	0	0	0	0	0
H ₃	0	0,2	0,1	0	0	0
Total	1,45	3,25	3,4	2,9	2,6	2,45

The sowing of the pea was after the harvest of the rye in the beginning of summer. The sowing got into the residue of the leaves and spear of the rye. The residue had a big measurement because of the late loom of the catch-crop. In absence of precipitation in June and in July it has set back the start up of the pea. I got similar results to the early spring surveying by the weed-surveying on 25. July; in point of weed-cover. The value of the weed-cover changed between 2,23-9,71% where the rye as a catch-crop was. I estimated a higher value by the pea without catch-crop (5,52-11,8%). The repressive effect of the rye was sensible. By the tillage variant a₃ was the weed-cover more than 8% (Kádár, 2005). By the other experiment area was the weed-cover above 8% in case of four tillage variant (a₁, a₂, a₄, a₆). I got the smallest density by disking (12-20cm) (a₃, a₅). The application of the catch-crop has reduced the average weed-cover in three cases (a₁, a₄, a₆) with more than 70% compared with pea-stand without the catch-crop.

Table 3. Results of weed-surveying by pea after catch-crop
Gödöllő, 25. 06. 2004.

Vegetable	Average weedcover (%)					
	a ₁	a ₂	a ₃	a ₄	a ₅	a ₆
T ₁	0,2	0,5	1,03	0,03	0,35	0,53
T ₂	0,32	0,53	0,2	0,68	0,43	0,18
T ₃						
T ₄	1,66	5,51	8,43	0,6	4,32	2,3
G ₃	0,05	0,85	0	0	0,05	0
H ₃	0	0,08	0,05	0	0	0
Total	2,23	7,47	9,71	1,31	5,15	3,01

Table 4. Results of weed-surveying by pea
Gödöllő, 25. 06. 2004.

Vegetable	Average weedcover (%)					
	a ₁	a ₂	a ₃	a ₄	a ₅	a ₆
T ₁	0,67	0	0	0,1	0,2	0
T ₂	5,18	3,1	3,78	5,2	3,17	2,8
T ₃	0,42	0,06	0	0,13	0	0
T ₄	2,04	8,56	1,71	4,76	2,4	7,93
G ₃	0,45	0	0	0	0	0
H ₃	0,09	0,16	0,03	0	0,05	0,05
Total	8,85	11,88	5,52	10,16	5,88	10,78

On the score of results of the searches is statable the beneficent effect of the rye as a catch-crop by protection against weeds. By the right technology and by the correct measurement residue the rye could bee an excellent forecrop. I find out that the weed-cover has passed

neither by rye nor by the pea the 8% weed-cover, under this value we do not have to calculate on injury. In this stand, with less herbicide, by less loading of the environment we can protect successfully against the weeds.

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