

INVESTIGATING NUTRITIONAL RELATIONSHIP AMONG WEEDINESS, YIELD AND QUALITY OF WINTER WHEAT

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Introduction

There is a lot of factor which can influence the yield and the quality of winter wheat. One of them is weediness. One of the most important elements of the plant protection procedure of winter wheat is the weed control. Herbicides application became the traditional element of the production technology of winter wheat. The technology of spraying herbicides is based on widely used patterns, but recently the changing farming conditions necessities the elaboration of new method. As Debreczeni (1978) stated the usage the pesticides inevitable.

According to Pollhamerné (1988) it is important to take into consideration the quality of soil and the agrotechnics, when we evaluate the effect of the climate factors. Barta et al. (2004) investigated the effect of environmental factors on protein content. The effect of different water stress on the yield and yield components of winter wheat was evaluated by Baser et al. (2004). Barnard and Bona (2004) investigated the relation between the sprout damage and the falling number. According to Pepo and Győri (1997) there are three groups of elements influencing the quality of winter wheat. The first group is the biological elements (variety), the second group is the agro-ecological condition (weather, soil and configurations of the terrain), and the third group is the agrotechny. This paper focuses on the relationship among the weediness, the yield and the quality at winter wheat.

Methods

A several-years experiment was run at Hatvan-Nagyombos to evaluate the effect of late application of herbicides on weeds, quality and quantity of winter wheat yield. The response of Mv 21, Fatima 2 and the Alföld 90 winter wheat varieties were evaluated. The herbicides – Starane 250 EC (fluroxipir), Pardner (bromoxynil) and the Banvel 480 (dikamba) – were sprayed at the Feekes 9-10 growth stage of winter wheat (Table 1.).

Table 1. Herbicide treatments at Alföld 90, Fatima 2 and Martonvásári 21 winter wheat species (Nagyombos, 1996-1999)

Treatment	Dose l/ha	Application time
A Control	-	-
B Cleaned	-	Feekes 9-10
C Starane	0,8	Feekes 9-10
D Pardner	2	Feekes 9-10
E Banvel 480	0,2	Feekes 9-10

The yield, the hectoliter weight, the protein content, the wet gluten, the farinographic value, the falling number and the weediness was measured. The data of the 1996-1999 experimental years were evaluated by correlation and factor analysis (Sváb, 1979).

Results and discussion

The table 2. shows the results of the correlation analysis.

Table 2. The correlation analysis of different values in winter wheat

	Hl weight	protein %	wet gluten %	farinographic value	falling number	yield t/ha	weed db/m ²
Hl weight	1	-0,214	0,040	0,325	0,518	0,881	-0,449
protein %	-0,214	1	0,912	0,623	0,313	-0,301	-0,301
wet gluten %	0,040	0,912	1	0,781	0,518	-0,120	-0,462
farinographic value	0,325	0,623	0,781	1	0,721	0,225	-0,590
falling number	0,518	0,313	0,518	0,721	1	0,435	-0,682
yield	0,881	-0,301	-0,120	0,225	0,435	1	-0,397
weed db/m ²	-0,449	-0,301	-0,462	-0,590	-0,682	-0,397	1

„r” critical value at 5 %: 0,2732

n = 50 at 1 %: 0,3541

at 0,1 %: 0,4433

There is a negative correlation between the weediness and all the other evaluated elements. The correlation positive between the wet gluten and the protein content, between the wet gluten and the farinographic value, between the falling number and the farinographic value, between the yield and the hectoliter weight, and between the yield and the falling number. In conclusion we can state, that the strictest positive correlation is between the wet gluten and the protein content. There is a considerable negative correlation between the protein content and the yield.

The factor analysis

There is only a few research subject where the description of the symptoms, at the revelation of the dependence of an effect upon a cause we can get the answer by examining sole variables. Also not sufficient to examine the different properties independently of each other. At the research work we are interested in more to know the underlying variables than the examined properties. These variables cannot be observed directly or they are complex incidents (ex. the quantity of soil, the diseases, the weather). At our factor analysis the plots were the unique observed units. The numbers of the observed units are 50. the variables are 7. The table 3. and the figure 1. show the results of the factor analysis.

Table 3. The result of factor analysis

Variable	Factors						
	I	II	III	IV	V	VI	VII
Hl weight	-0,526	-0,775	0,240	0,097	0,061	0,218	-0,062
protein %	-0,595	0,740	0,167	0,173	0,127	-0,113	-0,108
wet gluten %	-0,781	0,564	0,167	0,097	0,079	0,094	0,135
farinographic value	-0,900	0,183	0,125	-0,166	-0,337	-0,006	-0,023
falling number	-0,861	-0,178	-0,165	-0,400	0,198	-0,034	-0,007
yield t/ha	-0,417	-0,845	0,202	0,123	0,004	-0,233	0,050
weed db/m ²	0,793	0,167	0,518	-0,267	0,048	-0,013	0,004
Eigenvalue	3,5955	2,2736	0,4660	0,3224	0,1811	0,1248	0,0367
Var. %	0,514	0,325	0,067	0,046	0,026	0,018	0,005

From the point of view of examination the first and the second factor have importance, because the eigenvalue of these factors exceed the one. In the first factor we can find the wet gluten, the farinographic value and the falling number. This variable seems to change together. In this factor, there is the weediness with contrasted sign. In compliance with it we can state that in case the increasing weediness the wet gluten, the farinographic value and the falling number will decrease. In the second factor we can find the hl weight and the yield with the same sign. These two variables vary in the same way.

The observed variables are influenced mostly by the generation. Car the accumulation attach to generation we can state that the observed variables are influenced mostly by the generation. The effect of generation does not mean only the weather but the agro-technical elements and their interaction also.

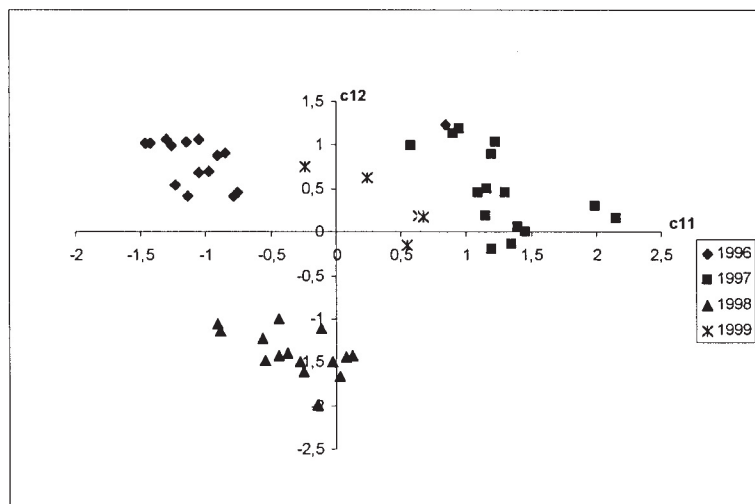


Figure 1. representation of observation units on the basis of the results of factor analysis (Kassai, 2004).

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References

- Barta, J, Kalinova, J, Moudry, J, et al. (2004): Effects of environmental factors on protein content and composition in buckwheat flour CEREAL RES COMMUN 32 (4): 541-548 p.
- Baser, I, Sehrali, S, Orta, H, et al. (2004): Effect of different water stresses on the yield and yield components of winter wheat CEREAL RES COMMUN 32 (2): 217-223 p.
- Barnard, A, Bona, L (2004): Sprout damage and falling number in South African and Hungarian wheats CEREAL RES COMMUN 32 (2): 259-264 p.
- Debreczeni B. (1978): Az intenzív műtrágyázás és a kémiai növényvédelem. A kemizálás és a biológia alapösszefüggéseinek kutatása. Tud. Tanácskozás, Gödöllő, 14 p.
- Kassai M. K. (2004): Az őszi búza minőségének herbológiai tényezői. Doktori (PhD) értekezés, Szent István Egyetem, Gödöllő, 135 p.
- Pepó P. – Györi Z. (1997): A minőségi búzatermesztés meghatározó tényezői. Gyak. Agrof. VIII. (10). 11-14 p.
- Pollhamer E-né (1988): A búza (legújabb minőségvizsgálati eredmények), Akad. Kiadó Budapest, 145 p.
- Sváb J. (1979): Többváltozós módszerek a biometriában. Mezőgazdasági Kiadó, Budapest, 222 p.
- Kádár, I. (2004): Szennyvíziszap-adagok hatása a növény (*Triticum vulgare* L.)-talaj rendszer néhány mikrobiológiai és biokémiai tulajdonságára (Impact of sludge treatments on some microbiological and biochemical properties of plant (*Triticum vulgare* L.)-soil system. – in Hungarian). Agrokémia és Talajtan. 53. 3-4. 331-342 pp
- Svetková, K.; Henselová, M.; Morvová, M. (2005): Effects of a carbonization product as additive on the germination, growth and yield parameters of agricultural crops. Acta Agron. Hun. 53. (3). 241-250 pp
- Tanács, L., Matuz, J., Gerő, L., Petróczi, I.M. (2005): Effect of NPK Fertilizers and Fungicides on the Quality of Bread Wheat in Different Years. Cereal Res. Commun. 33 (2-3): 627-634 pp