

EFFECT OF WATER AND NUTRIENT SUPPLY ON THE YIELD OF PEA VARIETIES

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Introduction

The effect of major production factors (forecrop, fertilization, irrigation) on the yield of pea sorts in 2005. was studied in a long-term experiment set up at the Látókép Experimental Nursery of Debrecen University, Centre for Agricultural Sciences, Hungary. The present paper uses the results of these experiments to examine crop production aspects of the causes and consequences of yield of different varieties of pea. The interaction between agrotechnical factors and sorts as well as the yield quality of pea, which yield will be presented in this paper, are studied by Győri, Z. (1981), Győri, Z. and Bocz, E. (1991), Csontos, Gy. (1992), Nemeskéri, E. and Győri, Z. (2005).

Methods

In the long-term experiment was the forecrop maize, pea sorts Luzsányi, Adept, Forman and Format, strength density: 1,1 million hectare⁻¹, in chernozem soil (silt + clay content: 50 %; Organic matter: 2,5 – 3,0 (Organic carbon 1,5 %); pH in KCl: 5,5 – 6,5; Whole nitrogen: 0,12 – 0,18 %; Ammonium lactate extracted Phosphorous in P₂O₅: 138 mg kg⁻¹; Ammonium lactate extracted Potassium in K₂O: 270 mg kg⁻¹).

The replication number was four, the experimental parcels were 46 m².

Rainfall in the growing season of pea in 2005 was: 303 mm, the irrigated water was 30 mm.

Results and discussion

The results of regression analysis and univariate analysis of variance in 2005. led to the following conclusions:

- By right of the results of the long-term experiment, it has been found that the yield of pea sorts is the most affected by the water-supply of the actual year (figure 1.) beside the used volume of fertilizer agent.
- The variant sorts of pea reacted different way to fertilizer correlating to water supply. Ascendant fertilizer agent effected significant yield growth (1,5 – 1,6 t ha⁻¹) of Adept and Forman sorts at favorable water supply in calcareous soil. The yield growth of Format, effected by chemical fertilizer was smaller (0,3-0,9 t ha⁻¹) (figure 1-2.), but it is statistically still trusty.
- The yield of Luzsányi pea has grown minimal up to N70 kg ha⁻¹ amount of fertilizer at irrigated conditions. When the amount of nitrogen in fertilizer exceeded 70 kg ha⁻¹ the yield of Luzsányi pea has fall. When there was no irrigation, this sort of pea has reached the largest yield at 140 kg ha⁻¹ of nitrogen fertilizer (table 1-2).
- At no irrigated conditions, the Format has produced the biggest yield (4,4 t ha⁻¹) of the four analyzed sorts, at the maximal amount of nitrogen (N140).

- The favourable water-supply promoted larger measure of intake of nutritive substance from the soil, even for the pea that is anyway able to get nitrogen from the atmosphere, and this way it ensured the chance of bigger formation of yield. The yield-excess of using fertilizer correlated to non irrigated and non fertilized parcels is 155-1227 kg ha⁻¹, while correlated to irrigated parcels is 441-1632 kg ha⁻¹ (figure 1, table 1-2.).
- The yield of pea is the most affected by the water-supply of the actual year beside the used volume of fertilizer agent and the irrigation. In the year 2005. in growing-season of pea there were in excess of many years mean -303 mm- fall. At non fertilized parcels this amount of rain was abundant for the claims of pease, and also in the different fertilized parcels the irrigation affected only 101,8-132,0 % yield-excess. The yield increase affect of fertilizing is far better at good water supply (106,9-150,0 %) (figure 1-2.).

Table 1. Effect of fertilization and irrigation on the yield (kg ha⁻¹) of pea sorts in 2005

Non irrigated	Luzsányi	Adept	Forman	Format
N ₀ P ₀ K ₀	4 52	3 051	3 123	3 254
N ₃₅ P ₃₀ K ₂₅	3 659	3 278	3 862	3 182
N ₇₀ P ₆₀ K ₅₀	3 790	3 778	4 112	3 421
N ₁₀₅ P ₉₀ K ₇₅	3 897	3 885	4 350	2 872
N ₁₄₀ P ₁₂₀ K ₁₀₀	4 374	4 028	4 183	3 313
Irrigated				
N ₀ P ₀ K ₀	3 432	3 278	3 099	3 242
N ₃₅ P ₃₀ K ₂₅	3 444	4 040	3 647	3 683
N ₇₀ P ₆₀ K ₅₀	3 873	4 231	3 850	3 468
N ₁₀₅ P ₉₀ K ₇₅	4 040	4 767	4 124	3 576
N ₁₄₀ P ₁₂₀ K ₁₀₀	3 671	4 910	4 648	4 159

Table 2: Effect of production factors on the yield of pea sorts in 2005

Source	Sum of Sq.	df	Mean Sq.	F	SD _{5%}
Irrigation	1104682,744	2	552341,37	2,746	+ 0,068
Sort	8109295,21	3	2703098,4	13,439	*** 0,000
Fertilization	11219513,57	4	2804878,4	13,945	*** 0,000
Irrigation x Sort	4799742,756	6	799957,13	3,977	*** 0,001
Irrigat. x Fertiliz.	1707699,265	8	213462,41	1,061	0,395
Sort x Fert.	2842254,423	12	236854,54	1,178	0,307
Irr.x Sort x Fert.	6376347,149	24	265681,13	1,321	0,165
Error	24136570,07	120	201138,08		
Total	2632071233	180			

***: P = 0,1 % + P = 10 %

Figure 1.

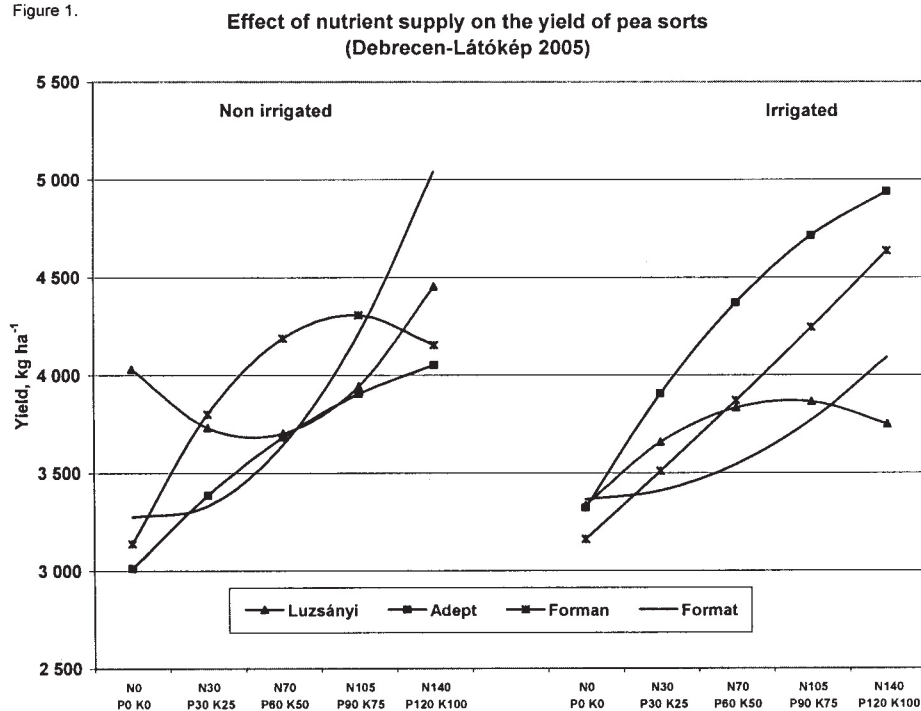
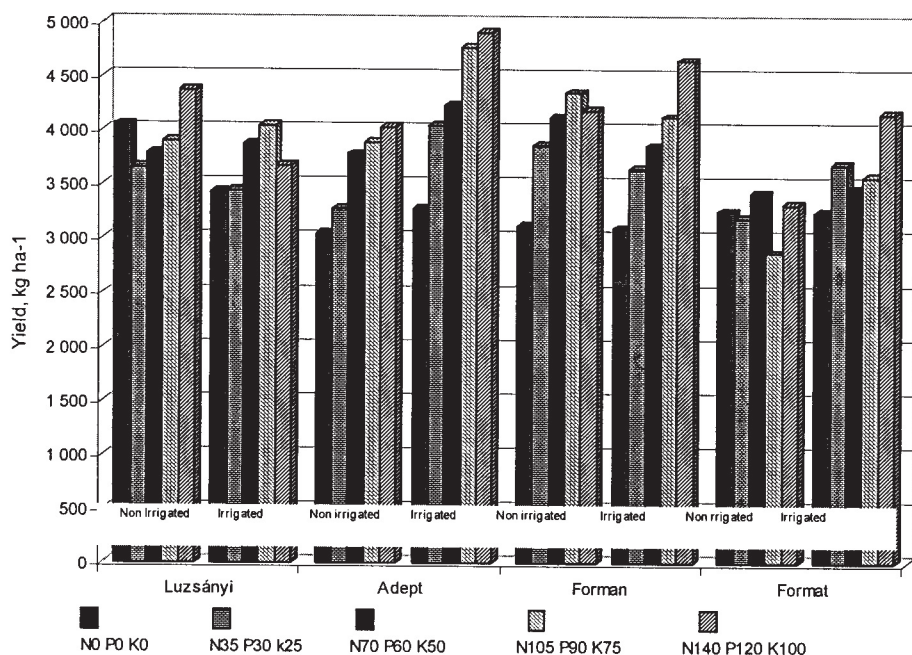


Figure 2.

Effect of irrigation on the yield of pea sorts (Debrecen-Látókép, 2005)**References**

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