

# Study of the Relationships between Technological and Productivity Elements that Determine Seed Yield in Birdsfoot Trefoil (*Lotus Corniculatus* L.)

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## Abstract

During an experience performed to elaborate an efficient technology of seed production in birdsfoot trefoil, we observed a series of correlations between yield and the elements of productivity, which exert a strong influence on seed quantity. In this viewpoint, the matrix of correlations between the elements of fructification, in the case of the influence exerted by birdsfoot trefoil cultivation method, made evident the following correlation coefficients:  $r = 0.81^{**}$ , between the number of pods/plant;  $r = 0.82^{**}$ , between the number of generative sprigs and the number of pods/inflorescence;  $r = 0.98^{**}$ , between the number of generative sprigs and the number of pods/plant.

**Key words:** birdsfoot trefoil, seed, correlation coefficients, element of productivity

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## 1. Introduction

Seed production in perennial forage legumes represents a technologically specialized activity, compared with other agricultural crops. In the case of birdsfoot trefoil (*Lotus corniculatus* L.), the genetic, morphological and physiological structure of this species requires a specific seed production technology, which is different from the technologies applied in the other perennial legumes [1 - 4].

This work presents the nature of correlations between the productivity elements that determine seed production in birdsfoot trefoil, under conditions of different cultivation methods.

## 2. Materials and methods

The researches were performed in the Research Centre for Pastures and Forage Plants from

Banat's University of Agricultural Sciences and Veterinary Medicine, during 2005-2009.

Of the multitude of experimental variants studied as regards the optimal seed production technology in birdsfoot trefoil, we selected two cultivation variants to study the correlations between the elements of productivity: V<sub>1</sub>- Pure birdsfoot trefoil crop; V<sub>2</sub>- Associated crop (birdsfoot trefoil 50 % + perennial ryegrass 25 % + orchard fescue 25 %). The general agri-fund, applied every year at the beginning of vegetation, included a dose of N<sub>50</sub>P<sub>50</sub>K<sub>80</sub>.

Planting norms: birdsfoot trefoil (pure crop), 16 kg/ha; birdsfoot trefoil (in associated crop), 10 kg/ha; perennial ryegrass, 7.5 kg/ha; orchard fescue, 7.5 kg/ha.

Varieties used: in birdsfoot trefoil, Danitim; in perennial ryegrass, Marta; in orchard fescue, Tâmpa.

Every year, the seed harvesting and the determination of productivity elements were performed at the second cutting. These elements of productivity, performed during the flowering-fructification period, were submitted to the

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following determinations: number of generative sprigs/plant, number of hulls/inflorescence and number of hulls/plant.

To make evident the relationships between the elements of productivity and the dimension of seed yields obtained, we applied the regression and correlation method.

### 3. Results and discussion

The results obtained showed that the seed production is possible in the case of birdsfoot trefoil cultivation in association or mixture with some perennial gramineae species, too. This method may be applied when the crop is not exclusively designed for seed production. Moreover, during the periods of utilization, when the birdsfoot trefoil proportion within the floristic structure is more than 50%, we may also obtain bigger seed yields. Successive to the study of correlations between seed production and some elements of productivity for this character, we observed that there is a positive relationship between them, but not so tight like in the case of birdsfoot trefoil cultivation in pure crop.

The big values of the correlation coefficients determined depend on the number of generative sprigs formed/plant. In this viewpoint, there is a positive correlation between the number of generative sprigs/plant and seed production, but it is tighter in the situation of the pure birdsfoot trefoil crop (figure 1). While the correlation coefficient in the pure crop variant is  $r = 0.92^{**}$ , in the associated crop variant it decreases to  $r = 0.71$ . This shows that, in associated crop, the gramineae species exert a negative influence on the number of generative sprigs, because of the phenomenon of inter-specific competition.

Regarding the correlations between the number of hulls/inflorescence and seed production, the correlation coefficient values are significant for the two cultivation methods:  $r = 0.98^{***}$ , in the pure crop variant, and  $r = 0.87^{**}$ , in the variant planted in association.

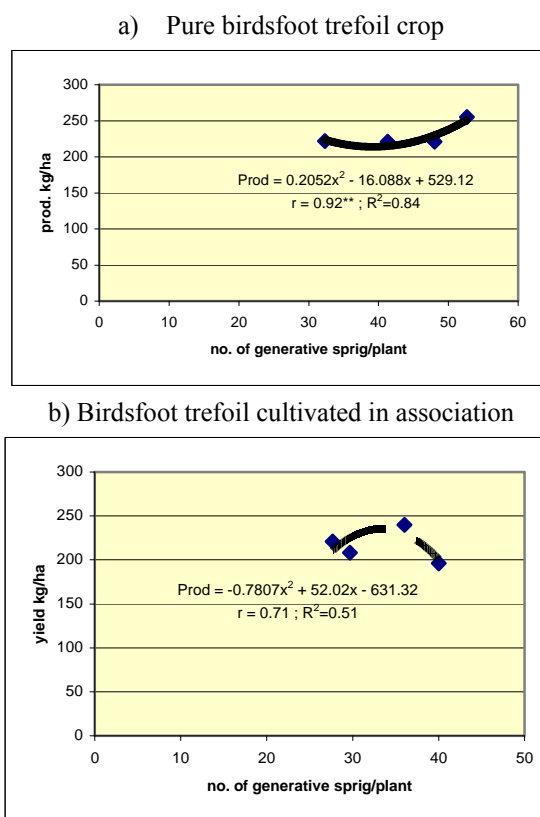


Figure 1. Correlation between generative sprig number/plant and yield

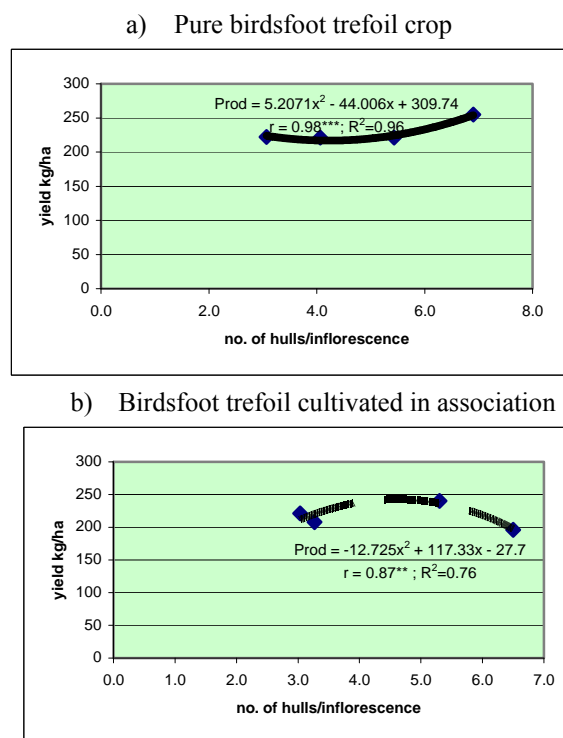


Figure 2. Correlation between the number of hulls/inflorescence and yield

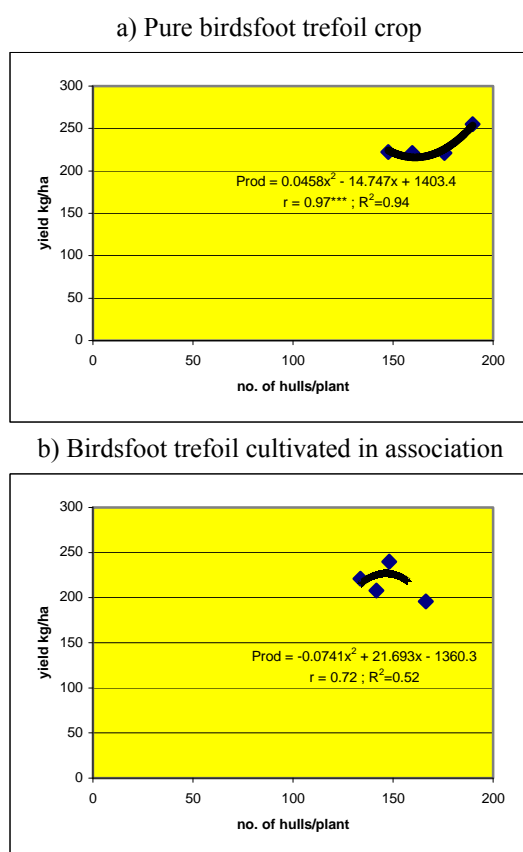


Fig. 3. Correlation between the number of hulls/plant and yield

The number of hulls/plant is strongly correlated with seed production in the pure birdsfoot trefoil crop ( $r = 0.97$  \*\*\*) and less with the crop in association ( $r = 0.72$  \*).

The matrix of correlations between the main elements of productivity, which determine seed production in birdsfoot trefoil, presents a direct, positive linear relationship (Table 1). The calculated correlation coefficients values are statistically significant and are differentiated as follows:

- Between the number of hulls/inflorescence and the number of hulls/plant, the correlation coefficient is  $r = 0.81$  \*;
- Between the number of generative sprigs and the number of hulls/inflorescence  $r = 0.82$  \*\*;
- Between the number of generative sprigs and the number of sprigs/plant  $r = 0.98$  \*\*\*.

The advanced studied on the nature of correlations between the elements of fructification represents an important step in the achievement of new genotypes, with big seed yields, in the birdsfoot trefoil crop.

Table 1. Matrix of correlation coefficients between the elements of productivity in seed production in birdsfoot trefoil

Structure of elements	Number of hulls/plant	Number of generative sprigs/plant
Number of hulls/inflorescence	0.81 *	0.82 **
Number of hulls/plant	-	0.98 ***

#### 4. Conclusions

The values of the coefficients of correlation between the elements of productivity for seed and seed production are differentiated according to the method of cultivation, too, in birdsfoot trefoil.

On the whole, in the pure birdsfoot trefoil crop, the correlation coefficients dimension is bigger than in the variant planted in association with some perennial gramineae species.

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