

Influence of Seed Size and Weight used in Sowing on Common Bird's-foot-trefoil (*Lotus corniculatus* L.) Plant Vigour

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Abstract

Growth and development of common bird's-foot-trefoil (*Lotus corniculatus* L.) plants are influenced by seed size and weight upon sowing. Studies show that the five seed size groups influence plant vigour, i.e. a 2-4 times increase of morphological organs (roots, seedlings, leaves) in larger and heavier seed group than in smaller and lighter seed group. This increase was also pointed out by the strong correlations between seed size and plant vigour.

Keywords: common bird's-foot-trefoil (*Lotus corniculatus* L.), seed size, plant vigour, correlation coefficients.

1. Introduction

Research carried out shows that seed size (size and weight) influences not only seed quality (germination) but also the vegetative growth of plants [1-3]. Seed quality ensures a stronger growth of the plants and a higher level of density and uniformity of the crops [4]. Certain studies point out the existence of positive relations between seed weight and size and the share of germinated seeds [5,6]. In common bird's-foot-trefoil, seed size influences the growth and development of the plants, hence the importance of calibrating the seeds before sowing [7-10]. This paper points out the influence of seed size and weight upon sowing on seed quality and plant vigour in common bird's-foot-trefoil.

2. Materials and methods

Research was carried out in vegetation dishes during the vegetation period in 2014, at the Centre

for Research in Grassland and Fodder Plants of the Banat's University of Agricultural Science and Veterinary Medicine "King Michael I of Romania" from Timisoara, Romania. The biological material used was the Nico cultivar of *Lotus corniculatus* L. from seed produced in 2013. Before sowing, the seeds were selected and grouped into five groups depending on seed diameter: a1 – very small seeds ($\varnothing=0.50-1.00$ mm), a2 – small seeds ($\varnothing=1.01-1.25$ mm), a3 – medium-size seeds ($\varnothing=1.26-1.40$ mm), a4 – large seeds ($\varnothing=1.41-1.50$ mm) and a5 – very large seeds ($\varnothing=1.51$ mm). We sowed from each seed group several seeds in vegetation vases and after sprouting we preserved only ten plants per vase that were studied individually during the vegetation period.

Measurements of common bird's-foot-trefoil seed quality used in the experiment are shown in Table 1. Thus, depending on seed size, seed weight (MMB) reached values ranging between 1.16 g (very small seeds) and (1.44 g of very large seeds). Germination reached values ranging between 77 and 90% depending on seed size, and

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the duration of germination oscillated between 26 and 33 days (longer in the small seed group). During vegetation, we carried out observations and made measurements regarding the growth and development of the aerial vegetative system (seedlings + leaves) and of the root system. Research data were processed statistically with the

variance analysis and the DUNCAN Test. Likewise, in order to point out the existence of a relationship between sowed seed size and the rate of growth and development of common bird's-foot-trefoil plants; we also carried out a study on the correlations between the variables taken into account.

Table 1. Influence of *Lotus corniculatus* L. seed size on seed weight, germination and duration of germination

Variants	Seed weight (MMB, g)	Germination (%)	Duration of germination (days)
a1 – very small seeds (Ø=0.5-1.0 mm)	1.16	90	32
a2 – small seeds (Ø=1.01-1.25 mm)	1.22	87	33
a3 – medium seeds (Ø=1.26-1.40 mm)	1.27	83	30
a4 – large seeds (Ø=1.41-1.50 mm)	1.38	79	28
a5 – very large seeds (Ø=1.51-1.60 mm)	1.44	77	26

3. Results and discussion

Common bird's-foot-trefoil seed production shows there is a wide range of seed size, i.e. from small diameter seeds (below 0.5 mm) to large

seeds (2 mm). This diversity can influence the vigour of the plants from the seeds sowed and also the growth and development of the plant vegetative apparatus.

Table 2. Influence of *Lotus corniculatus* L. seed size on plant growth and development.

Variants	Seedlings and leaves (g/plant)	Roots (g/plant)	Whole plant (g/plant)
a1 – very small seeds (Ø=0.5-1.0 mm)	2.55	2.48	4.44
a2 – small seeds (Ø=1.01-1.25 mm)	5.05***	9.17***	13.26***
a3 – medium seeds (Ø=1.26-1.40 mm)	5.44***	14.06***	19.84***
a4 – large seeds (Ø=1.41-1.50 mm)	4.12***	11.40***	15.47***
a5 – very large seeds (Ø=1.51-1.60 mm)	1.85°°	4.45**	6.37**
DL 5%	0.44	1.14	1.34

Studies carried out show that common bird's-foot-trefoil seed size influence plant growth and development (Table 2). Thus, in the aerial vegetative apparatus (seedlings and leaves), there was an almost twofold increase in the variants sowed with larger seeds than in the variant sowed with very small seeds.

The largest differences in increase were in the common bird's-foot-trefoil plant root system, where the increase compared to the variant sowed with very small seeds was about 3-5 times higher in the variants sowed with larger seeds. Statistically, these differences are ensured (DL>5%).

Table 3. Correlation coefficients between *Lotus corniculatus* L. seed size and weight and some germination and vegetative growth size features

Specification	Seed germination	Duration of germination	Seedling and leaf weight	Root weight	Whole plant weight
Seed size (Ø)	0.96*	0.99**	0.95*	0.87	0.87
Seed weight (MMB)	0.94	0.96*	0.99**	0.99**	0.99**

The study of the correlations points out the existence of some direct relationships between seed size and weight upon sowing and some size features of common bird's-foot-trefoil seed quality

and plant vigour (Table 3). Thus, as far as seed size is concerned, it correlates more with seed germination and duration of germination ($r=0.95^*$ and $r=0.99^{**}$) and the weight of the aerial

vegetative weight ($r=0.95^*$). Likewise, seed weight correlates strongly with the duration of seed germination ($r=0.96^*$) and the weight of the root system and of the aerial vegetative system ($r=0.99^{**}$).

4. Conclusions

Common bird's-foot-trefoil plant vigour is influenced by the seed size and weight, which determine an increase of 2-4 times of the plants when using larger seeds in sowing. Seed size and weight correlate strongly with seed germination ($r=0.94$) and with plant vegetative apparatus weight ($r=0.96^{**}$).

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