COMPARATIVE TEST OF FENUGREEK / TRIGONELLA FOENUM-GRAECUM L. / VARIETIES

KÜLÖNBÖZŐ GÖRÖGSZÉNA / TRIGONELLA FOENUM-GRAECUM L. / FAJTÁK ÖSSZEHASONLÍTÓ VIZSGÁLATA

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ABSTRACT

Experiments in connection with Fenugreek have been carried out at our university for two decades. As a part of this work the variety Óvári-4 was awarded with a state certificate in 1994. The variety and the developed production technology were given patent protection.

At the beginning testing concentrated on the plant as leguminous roughage (28 t/ha yield) and as protein plant (the protein content of the seed is between 30-33%, however recently the tests were extended to assess the use of the plant as medicinal plant.

Plants from various ecological environments were obtained from institutes abroad, these plants were propagated, selected and compared to each other with respect to average yield, inner content value. As for today two new national variety candidates were bred, their introduction for qualification is planned for 2004.

In our studies the comparative examination of 10 foreign varieties, the variety *Óvári-4* and the variety candidate named *Óvári Gold* is evaluated.

In the experiment the effect of optimal germ number on yield was examined for the variety Óvári-4.

KEYWORDS: fenugreek, medicinal plant, variety, variety candidate, yield

ÖSSZEFOGLALÁS

Egyetemünkön két évtizede folyik kutatás a görögszénával kapcsolatban, e munka részeként 1994-ben állami elismerést kapott az *Óvári-4* fajta. A fajta, valamint a kidolgozott termesztéstechnológia szabadalmi oltalom alatt áll.

Kezdetben, mint pillangós szálastakarmányt és fehérjenövényt vizsgáltuk. Az utóbbi években kutatásainkat kiterjesztettük gyógynövényként történő hasznosítására is.

Jelen publikációnkban 10 külföldi fajta, az *Óvári-4* hazai fajta és az *Óvári* gold néven említett fajtajelölt összehasonlító vizsgálatainak eredményeit értékeljük.

KULCSSZAVAK: görögszéna, gyógynövény, fajta, fajtajelölt, termés.

INTRODUCTION AND LITERATURE REVIEW

The changes in the economic conditions of agricultural production, overproduction in the traditional agricultural communities, and the deriving marketing difficulties all urged both researchers and agricultural producers to look for plant species which could be produced in an economically viable way, which expand biodiversity, and which can be fitted into the applied (sustainable) producing systems.

Fenugreek, which has been produced for ages, is one of the most favourite fodder and medicinal plants of the Eastern Mediterranean and subtropical climate countries. It was a widespread field crop in ancient Egypt and in the Roman and Greek empires.

It is native at the coastal regions of the Mediterranean, but India, China, Egypt, Turkey and Morocco are also counted as production areas.

Due to its excellent adaptation abilities this plant can be produced as spring sown plant in various countries of temperate climate. In Egypt, Morocco and India it is produced as a plant that survives the winter ([2]).

In Hungary in the Hungarian Herbal Book of Diószegi, Sámuel and Fazekas, Mihály published in 1807 it is mentioned as a herb growing in the wild. Before 1945 the plant was produced in small scale conditions, but later its production was stopped.

When green, it is mainly used to feed ruminants, however it is also suitable for producing green flours. It can be used as a leguminous component of annual fodder mixtures.

Due to its high sugar content it can be ensilaged on its own, and as hay mixed with straw it is an invaluable fodder for horses improving the palatability of the fodder.

The nutritional value of its seed is almost the same as that of soybean, however it has an additional advantage, not containing anti-nutritive components, therefore requiring no heat treatment ([4]).

The seed of Fenugreek contains alkaloid, colin, bitter material, fatty acid, protein and vitamin C.

It also contains diastase, alkaloids, and materials, which are excellent remedies for dysiorexia and weakness resulting from emaciation. It improves the appetite, it is a general health-restorer, it has a fattening effect, increases the number of red blood cells and restores the strength of a physically strained body. It is rich in phosphorus, organic iron and carbohydrates ([1], [3]).

MATERIALS AND METHODS

During the experiments the authors tried to establish how the Fenugreek varieties from different ecological areas adapt to the Hungarian conditions; which varieties could have a future in Hungarian agriculture; which varieties could be used for breeding new Hungarian varieties, and what the optimal germ number per hectare was for the variety Óvári-4.

The sowing experiments were carried out in 4 random replications in blocs, every year approximately at the same time. For the variety and germ number experiment in 2002 the seeds were sown on March 28, for the experiments in 2003 they were sown on April 2 with a small plot sowing machine, and the row space was 12 cm.

The net size of the plots was $10m^2$, and the plant density was around 2000000 plants per hectares. Manual weed control and continuous mapping was done regularly.

The crop was harvested plot by plot with a plot harvester in full maturation at the end of July in both years. The gained data were adjusted for moisture content of 14%.

For assessing the effect of the year, and for the comparison of the varieties and the variety candidates the seeds propagated in 2001 were used for sowing both in 2002 and 2003. Thus considering the year and varieties the resulting strain-experiment had two variables and a split-plot set-up. Results are shown in **Table 1 and Table 2**.

In the light of the experiments the weed oppressing ability of this plant is low therefore manual weed control is necessary. In the later stages of vegetation this ability improves, thus weed control had to be applied only at plots with low number of plants.

In the variety experiments the following varieties and variety candidates were used (their origin is indicated in parentheses): 19 X (Syria), BLIDET (Spain), CIADONCHA (Spain), D-19 (Syria), GERS (France), GHAHKAMON (Libya), HEBAR (India), H-26 (Syria), METHA (India), OBANOS (Spain), ÓVÁRI-4 (Hungary), and the variety candidate Óvári Gold (Hungary).

The reliability of the experiments was shown by the significant differences computed by the analysis of variance. The tables show the Sum of Squares and Mean Square values usually computed by the standard computation procedures (see e.g. [5]) , and in the case of the multivariate the significance of the interaction of the two variables.

RESULTS AND DISCUSSION

Table 1 shows the results for testing the impact of the year (variable A) and the impact of the variety (variable B) the yields of the plant.

In the analysis of variance a reliable yield difference at the probability level of p=0.1% was established both at the interaction of AxB (year and variety), and the effect of variable B (variety).

The differences measured between the yields taken in different years from genetically similar materials proved to be significant at the error probability level of 5% (Table 1). In the year of 2002 the water-deficit was significant compared to 2003 and the same is true for the vegetation period (March to July) as well.

The average yields of the tested varieties for the tested two years showed in certain cases significant differences (Table 2).

The yield averages of year 2002 and year 2003 were also compared. Table 3 shows that the impact of the years is proven to be significant at the probability level of 5%.

Table 1. Results of the analysis of variance for the seed yield of Fenugreek varieties (t/ha)

Variables	Sum of Squares	Degree of Freedom	Mean Squares
Altogether	7774460.9	95	
Replication	890163.5	3	
Variable A	214493.4	1	214493.39 *
Error	53819.3	3	17939.76
Variable B	3668687.9	11	333517.09 ***
AxB interaction	1320859.1	11	120078.10 ***
Error	1626437.7	66	24643.00

*: the effect is significant at the probability level 5 %

***: the effect is significant at the probability level 0.1 %

Table 2: Yield differences of varieties

Varieties	Yield (t/ha)
ÓVÁRI GOLD	1.417
GHAHKAMON	1.213
METHA	1.201
19 X	1.049
ÓVÁRI-4	1.008
H 26	1.006
OBANOS	0.980
BLIDET	0.979
HERBAR	0.868
CIADONCHA	0.805
GERS	0.787
D 19	0.692
Significant Difference at 5 %	0.1562

Table 3: Impact of the year on the yield

Year	Yield (t/ha)
2002.	1.048
2003.	0.953
Significant Difference at 5 %	0.0869

In the first two years of our experiment it was proven that between the varieties and between the year-variety interactions there were significant differences.

In the two years the highest average yield was reached by the variety candidate Óvári Gold which adapted best to the Hungarian conditions, (1.42 t/ha), although GHAHKAMON (1.21 t/ha) and METHA (1.2 t/ha) also produced good average yield.

CONCLUSION

Significant differences were found between the Fenugreek varieties in the average yields of the two years assessed. The highest yielding variety was Óvári Gold (1417 kg/ha) and the productivity of the variety D19 was rather modest (692 kg/ha). During the breeding processes in our work the main aim was to improve the adaptability and the yield-stability of the varieties.

Among the imported varieties the Ghahkamon and the Metha varieties were best adapted to our climatic conditions.

The chemical analyses are now in progress and after finishing the evalution other new varieties might be prospective to be introduced in the Hungarian plant production.

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