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# EVALUATION OF FORAGE YIELDS IN THE URBAN POPULATIONS OF THREE VICIA SPECIES

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***Summary:*** The Annual Forage Legumes Collection of Institute of Field and Vegetable Crops in Novi Sad is constantly enriched with the wild populations of large-flowered vetch (*Vicia grandiflora* Scop.), narrow-leafed vetch (*Vicia sativa* L. subsp. *nigra* (L.) Ehrh.) and hairy vetch (*Vicia villosa* Roth). A small-plot trial was carried out from the autumn 2005 to the summer 2007 at the Experiment Field of the Institute at Rimski Šančevi, which included seven urban populations of large-flowered vetch, seven of narrow-leafed vetch and seven of hairy vetch. The average yields varied from 13.7 t ha-1 of green forage and 4.1 t $ha^{-1}$ of forage dry matter in the narrow-leafed vetch VN 03 to 50.9 t ha-1 of green forage and 11.7 t $ha^{-1}$ of forage dry matter in the hairy vetch VV 06.

***Key words:*** forage yields, hairy vetch, large-flowered vetch, narrow-leafed vetch, Vicia

## Introduction

Vetches (*Vicia* spp.) represent both a quality component of natural grasslands and a forage crop. Along with faba bean (*Vicia faba* L.), the most widely distributed vetch species are common vetch (*V. sativa* L.), Hungarian vetch (*V. pannonica* Crantz) and hairy vetch (*V. villosa* Roth). As many other annual legumes, vetches are utilised in the form of green manure, hay, forage meal, grain and straw (Mikić et al., 2006), as well as for grazing and green manure, with an increasing importance in the modern trends such as organic farming and sustainable agriculture (Ćupina et al., 2004).

Vetches are largely present in the flora of Serbia and are regarded as one of the oldest forage crops in the country (Đorđević, 1942). The Annual Forage Legumes Collection of Institute of Field and Vegetable Crops in Novi Sad is constantly enriched with wild populations of Serbian origin, collected mostly in the region of Novi Sad and Fruška Gora Mountain (Tomić et al., 2005). A majority of the collected accessions belong to large-flowered vetch (*Vicia grandiflora* Scop.), narrow-leafed vetch (*Vicia sativa* L. subsp. *nigra* (L.) Ehrh.) and hairy vetch, with all three species being extremely widespread not only in the countryside, but also in urban areas such as Belgrade or Novi Sad.

The objective of the study was to evaluate the potential for forage yield in diverse urban populations of three vetch species.

## Materials and Methods

A small-plot trial was carried out from the autumn 2005 to the summer 2007 at the Experiment Field of Institute of Field and Vegetable Crops at Rimski Šančevi. It included 21 urban populations collected in the region of Novi Sad, seven of them belonging to large-flowered vetch, seven belonging to narrow-leafed vetch and seven belonging to hairy vetch.

All populations were sown in early October, with a rate of 180 viable seeds $m^2$, a plot size of 5 $m^2$ and three replications, and were cut at the stages of full flowering and formation of the first pod (Mihailović et al., 2006).

Plant height (cm), number of stems and lateral branches (plant$^{-1}$), number of internodes (plant$^{-1}$) and green forage yield per plant (g) were determined from plant samples taken just before cutting, ten plants per replication. Green forage yield per unit area (t ha$^{-1}$) was determined on the basis of green forage yield (kg) per plot, measured in situ immediately after cutting. Forage dry matter yield (t ha$^{-1}$) and forage dry matter proportion were determined as a ratio between the weight of green forage samples after and before the drying at room temperature.

Results were processed by the analysis of variance (ANOVA) applying the least significant difference (LSD) test using the computer software MSTAT-C.

## Results and Discussion

There were significant differences between the examined populations at the levels of both 0.05 and 0.01 in all monitored characteristics (Table 1).

The average plant height ranged between 30 cm in the narrow-leafed vetch VN 07 and 235 cm in the hairy vetch VV 02. The average values of plant height in the populations of narrow-leafed vetch were within the taxon's average (Mihailović et al., 2007a). The largest number of stems and lateral branches was in the narrow-leafed vetch VN 07 (20.3 plant$^{-1}$), while the smallest number of stems and lateral branches was in the hairy vetch VV 01 (2.2 plant$^{-1}$). The large-flowered vetch VG 07 had the largest number of internodes (316.8 plant$^{-1}$), while the narrow-leafed vetch VN 02 had the largest number of internodes (50.2 plant$^{-1}$).

The average yields varied from 13.7 t ha$^{-1}$ of green forage and 4.1 t ha$^{-1}$ of forage dry matter in the narrow-leafed vetch VN 03 to 50.9 t ha-1 of green forage and 11.7 t ha$^{-1}$ of forage dry matter in the hairy vetch VV 06. With average yields of 28.9 t ha$^{-1}$ of green forage and 7.7 t ha$^{-1}$ of forage dry matter, the large-flowered vetch populations proved their ability to produce considerable amounts of both green and forage dry matter (Mihailović et al., 2007c).

On average, the hairy vetch populations had significantly higher yields of green forage (38.5 t ha$^{-1}$) and forage dry matter (9.0 t ha$^{-1}$) in comparison with the other two species, which was in accordance with the preliminary results (Mihailović et al., 2007b).

*Tab. 1. Average values of forage yield components and forage yields in urban populations of large-flowered, narrow-leafed and hairy vetches at Rimski Šančevi for the years of 2006 and 2007*

| Species | Population | Plant height (cm) | Number of stems and lateral branches (plant$^{-1}$) | Number of internodes (plant$^{-1}$) | Green forage yield (t ha$^{-1}$) | Forage dry matter yield (t ha$^{-1}$) |
|---|---|---|---|---|---|---|
| *V. grandiflora* | VG 01 | 92 | 9.3 | 196.2 | 35.1 | 11.1 |
| | VG 02 | 40 | 4.8 | 76.1 | 21.4 | 4.7 |
| | VG 03 | 45 | 6.1 | 120.1 | 25.5 | 5.6 |
| | VG 04 | 57 | 6.3 | 68.3 | 27.4 | 6.0 |
| | VG 05 | 75 | 9.1 | 172.9 | 35.5 | 9.9 |
| | VG 06 | 62 | 12.8 | 255.0 | 26.3 | 7.6 |
| | VG 07 | 77 | 13.7 | 316.8 | 31.3 | 8.8 |
| | Average | 64 | 8.9 | 172.2 | 28.9 | 7.7 |
| | $LSD_{0.05}$ | 17 | 2.6 | 34.1 | 5.8 | 1.8 |
| | $LSD_{0.01}$ | 22 | 4.0 | 49.5 | 7.3 | 2.3 |
| *V. sativa* ssp. *nigra* | VN 01 | 76 | 14.3 | 163.8 | 18.4 | 5.0 |
| | VN 02 | 60 | 8.1 | 50.2 | 33.4 | 7.3 |
| | VN 03 | 42 | 5.9 | 67.3 | 13.7 | 4.1 |
| | VN 04 | 35 | 4.1 | 138.9 | 14.5 | 4.4 |
| | VN 05 | 72 | 5.8 | 70.8 | 17.4 | 5.0 |
| | VN 06 | 70 | 5.1 | 83.8 | 15.8 | 5.0 |
| | VN 07 | 30 | 20.3 | 234.8 | 21.2 | 4.6 |
| | Average | 55 | 9.1 | 115.7 | 19.2 | 5.1 |
| | $LSD_{0.05}$ | 14 | 2.6 | 21.4 | 5.6 | 1.3 |
| | $LSD_{0.01}$ | 19 | 4.0 | 35.7 | 7.8 | 1.9 |
| *V. villosa* | VV 01 | 193 | 2.2 | 58.2 | 33.2 | 9.6 |
| | VV 02 | 235 | 15.3 | 163.3 | 47.3 | 9.6 |
| | VV 03 | 121 | 3.7 | 53.1 | 23.3 | 7.7 |
| | VV 04 | 125 | 5.4 | 72.8 | 29.4 | 6.0 |
| | VV 05 | 118 | 6.2 | 100.8 | 45.6 | 10.4 |
| | VV 06 | 145 | 7.8 | 110.3 | 50.9 | 11.7 |
| | VV 07 | 101 | 8.0 | 139.9 | 39.9 | 7.7 |
| | Average | 148 | 6.9 | 99.8 | 38.5 | 9.0 |
| | $LSD_{0.05}$ | 6 | 2.5 | 24.3 | 4.8 | 1.1 |
| | $LSD_{0.01}$ | 14 | 3.8 | 35.8 | 6.3 | 1.7 |
| $LSD_{0.05}$ | | 20 | 2.8 | 37.2 | 6.0 | 2.1 |
| $LSD_{0.01}$ | | 28 | 4.5 | 52.7 | 8.2 | 2.8 |

## Conclusion

The urban populations of large-flowered, narrow-leafed and hairy vetches have shown a high level of variability of the characteristics of agronomic importance related to forage and may be regarded as having a considerable potential for the development of first Serbian cultivars of large-flowered and nar-

row-leafed vetches and new cultivars of hairy vetch suitable for forage production and green manure.

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