INVESTIGATION OF SOME QUANTITATIVE TRAITS IN AUTOCHTHONOUS TOBACCO VARIETIES IN REPABLIC OF MACEDONIA

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ABSTRACT

Investigations were carried out with five autochthonous tobacco varieties of the types Prilep (P 10-3/2 and P 12-2/1), Djebel (Dj № 1) and Yaka (YK 7-4/2 and KY), to study their quantitative traits: height of the stalk with inflorescence, number of leaves and dry mass yield per stalk. The trial was set up in the Experimental field of Tobacco Institute-Prilep in 2011 and 2012, in randomized block design with four replications. Traditional cultural practices were applied for realization of the experiment.

The aim of investigations was to evaluate the variability of the above quantitative traits typical for the autochthonous varieties by the use of biometric analysis and to give directions for their maintenance in future.

The significant differences observed among the traits of investigated varieties indicate that they are different cultivars. No significant differences were observed between the two years of investigation, which is an indication of highly heritable traits. Statistical parameters of variability are low, which is an indication of stable and homozygous genotypes, adapted to agro-ecological conditions of the region. Results on the standard deviation and variability coefficient were lower in 2012, because the seed sawn in this crop was obtained from one stalk for each variant isolated in 2011. The lowest statistical data on variability of stalk height and leaf number in both years were recorded in the varieties of Prilep tobacco, and for dry mass yield in the Yaka variety KY.

Keywords: tobacco (Nicotiana tabacum L.), autochthonous varieties, quantitative traits, standard deviation, variability coefficient

ПРОУЧУВАЊА НА ПОВАЖНИТЕ КВАНТИТАТИВНИ СВОЈСТВА КАЈ АВТОХТОНИ СОРТИ ТУТУН ВО РЕПУБЛИКА МАКЕДОНИЈА

Проучувани беа пет автохтони сорти тутун од типовите прилеп (П 10-3/2 и П 12-2/1), џебел (Џ бр.1) и јака (ЈК 7-4/2 и КЈ), за поважните квантитативни својства: висина на стракот со соцветие, број на листови по страк и принос на сува маса по страк. Опитот беше поставен на опитното поле при Научниот институт за тутун – Прилеп во текот на 2011 и 2012 година, по случаен блок-систем во четири повторувања. За време на вегетацијата беа реализирани вообичаени агротехнички мерки. Целта на истражувањата е преку биометричка анализа на наведените квантитативни својства карактеристични за автохтоните сорти да направиме евалуација на нивната варијабилност, како и да дадеме насоки за нивно понатамошно одржување. Својствата помеѓу варијантите сигнификантно се разликуваат што значи дека се работи за различни сорти. Не постојат сигнификантни разлики кај вредностите меѓу двете години на истражување, а тоа е знак за високо наследни својства. Статистичките параметри на варијабилност се ниски, што значи дека анализиравме стабилни, хомозиготни генотипови, адаптирани во агроеколошките услови на овие простори. Резултатите за стандардната девијација и коефициентот на варијабилност се пониски во 2012 година, бидејќи семето посеано за оваа реколта потекнува од по еден страк за секоја варијанта изолиран во 2011 година. Најниски статистички показатели за варијабилноста за првото и второто својство во

двегодишните истражувања покажаа сортите од типот прилеп, а за третото својство сортата KJ од типот јака.

Клучни зборови: тутун, автохтони сорти, квантитативни својства, стандардна девијација, коефициент на варијабилност.

INTRODUCTION

Autochthonous varieties are old local varieties which are no longer grown because their production has no economic justification. Still, they are the first ring in the chain of newly created superior varieties and present valuable genetic resources that must be preserved. Nowadays, the European Parliament issues laws by which farmers from the EU countries are obliged to grow only the crops from the List of approved varieties. The use of old and rare varieties will be punishable, thus leading to prevention of genetic diversity of the species and to a risk of extinction of the native (indigenous) plant species. In order to prevent this from happening, a number of projects have been activated for preservation of plant resources through establishment of regional network for cooperation and formation of working groups for various cultivated crops, including tobacco.

The aim of this paper is to study the autochthonous tobacco varieties and, through a biometric analysis of quantitative traits (stalk height with inflorescence, leaf number per stalk and dry mass yield per stalk), to make evaluation on their variability, as well as to give directions for their maintenance in the future.

MATERIAL AND METHOD

Investigations included studies of five oriental autochthonous tobacco varieties of the types Prilep (P 10-3/2 and P 12-2/1–Ph. 1), Djebel (Dj № 1) and Yaka (YK 7-4/2 – Ph.2 and KY - Kishinska Yaka). The trial was carried out in 2011 and 2012 in the field of Scientific Tobacco Institute-Prilep in a randomized block design with four replications. During the vegetation period, adequate cultural practices were applied on tobacco.

During tobacco vegetation in field (May - September) in 2011, mean monthly temperature was 19,04[0]C, number of rainy days was 32 and total precipitation amount was 180 mm. In the same period in 2012, mean monthly temperature was 20,3[0]C, number of rainy days 26 and total precipitation amount 180 mm.

Subject of the investigations were the quantitative trait: stalk height with inflorescence, leaf number per stalk and dry mass yield per stalk.

Standard deviation (σ) is an indicator of the variability of quantitative characters. It indicates the mean square deviation from the arithmetic mean and is a result obtained from the square root of the variance. It is calculated by the following formula:

$$\sigma = \pm \sqrt{\frac{\Sigma \left(x - \bar{x} \right)^2}{n}} \qquad \sigma = \pm \sqrt{\sigma^2}$$

If the representative sample consists of lower number of individuals, the following formula is used:

$$\sigma = \pm \sqrt{\frac{\Sigma \left(x - \overline{x} \right)^2}{n-1}}$$

Standard deviation is expressed with the same measurement with which the investigated character is measured.

The degree of variability of characters is calculated from the standard deviation by the following formula:

$$V\,(\%) = \frac{\sigma \cdot 100}{\overline{x}}$$

The above formulas for calculation of standard deviation and variability coefficient were used by Najčevska (2002).

RESULTS AND DISCUSSION

The two-year biometric investigations of autochthonous tobacco varieties in the Republic of Macedonia for the quantitative traits: stalk height with inflorescence, leaf number per stalk and dry mass yield per stalk showed low standard deviation and low degree of variability, which is an indication of stability and uniformity as a result of their homozygotness. In both years of investigation, the lowest values for stalk height were recorded in P 10-3/2 and P 12-2/1, while for leaf number per stalk and dry mass yield per stalk in Dj № 1 and YK 7-4/2. The highest values for the three studied traits showed KY (Table 1).

Table 1. Mean value and variability of the quantitative traits of the autochthonous tobacco varieties

Autochthonous tobacco varieties	Quantitative traits								
	Stalk height with inflorescence			Leaf number per stalk			Dry mass yield per stalk		
	$\overline{x} \pm s\overline{x}$ cm	δ	V (%)	$\overline{x} \pm s\overline{x}$	δ	V (%)	$\overline{x} \pm s\overline{x}$ g	δ	V (%)
2011									
1. P 10-3/2	$52 \pm 0{,}44$	4,14	7,95	$34 \pm 0{,}39$	1,76	5,15	$11{,}3 \pm 0{,}16$	0,72	6,37
2. P 12-2/1	$58 \pm 0{,}35$	3,32	5,72	$37 \pm 0{,}30$	1,35	3,64	$12{,}3 \pm 0{,}17$	0,75	6,12
3. Dj № 1	$89 \pm 0{,}62$	5,92	6,66	$30 \pm 0{,}43$	1,91	6,38	$7{,}8 \pm 0{,}12$	0,54	6,92
4. YK 7-4/2	$101 \pm 0{,}67$	6,33	6,27	$29 \pm 0{,}38$	1,71	5,99	$8{,}7 \pm 0{,}12$	0,54	6,23
5. KY	$119 \pm 0{,}85$	8,10	6,81	$42 \pm 0{,}42$	1,87	4,45	$14{,}8 \pm 0{,}12$	0,52	3,53
2012									
1. P 10-3/2	$54 \pm 0{,}28$	2,71	5,01	$36 \pm 0{,}32$	1,41	3,93	$10{,}2 \pm 0{,}13$	0,59	5,81
2. P 12-2/1	$56 \pm 0{,}33$	3,09	5,52	$38 \pm 0{,}24$	1,09	2,86	$13{,}0 \pm 0{,}15$	0,66	5,06
3. Dj № 1	$87 \pm 0{,}46$	4,34	4,98	$28 \pm 0{,}36$	1,63	5,80	$6{,}7 \pm 0{,}10$	0,47	6,93
4. YK 7-4/2	$103 \pm 0{,}66$	6,23	6,05	$31 \pm 0{,}37$	1,67	5,40	$10{,}4 \pm 0{,}11$	0,51	4,96
5. KY	$124 \pm 0{,}53$	5,07	4,09	$41 \pm 0{,}36$	1,61	3,93	$15{,}9 \pm 0{,}12$	0,52	3,26

Data presented in the table show that mean values of the investigated traits in 2011 with their statistical errors are approximately the same with those of 2012. Variability parameters are almost identical in both years of investigation. Meteorological reports also reveal that 2011 and 2012 were very similar with

regard to their mean monthly temperatures and precipitation amounts from May to September. This points out to precise estimations and good performance of the trial.

Ph. 1. P12-2/1

Ph. 2. Yk 7-4/2

CONCLUSIONS

The autochthonous tobacco varieties Prilep P 10-3/2, P 12-2/1, Djebel Dj № 1, Yaka YK 7-4/2 and KY - Kishinian Yaka bear the following characteristics:

- They are homozygous, due to which their population is very uniform, with high genetic stability.

- They have a low standard deviation and variability of the investigated characters, which indicates high genetic homogeneity.

- They present a sound basis in selection of tobacco for obtaining superior varieties.

REFERENCES

- Borojević S., 1981. Principi i metode oplemenivanja bilja. Ćirpanov, Novi Sad: 386.
- Gornik R., 1973. Oblagoroduvanje na tutunot. Tutunski kombinat-prilep: 168.
- Korubin-Aleksoska A., 2004. Tobacco varieties from Tobacco Institute – Prilep. Alfa Print – Skopje: 92.
- Najčevska C., 2002. Eksperimentalna statistika primeneta vo zemjodelskite i biološkite istražuvanja. Bona, Skopje: 202.