

SOME MORPHOLOGICAL AND BIOLOGICAL CHARACTERISTICS OF THE NEWLY CREATED ORIENTAL VARIETIES AND LINES OF PRILEP TOBACCO

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ABSTRACT

Morphological traits (plant height, leaf number, size and shape) and biological characteristics (length of the growing season) enable phenotypic identification of tobacco variety at first glance. Also, the resistance of tobacco variety to diseases is another biological characteristic of a genotype. Phenotypic expression of the variety is a result of mutual action (interaction) between genotype and the impact of environmental conditions in which the plant grows.

The aim of our investigation is to study some morphological traits, length of the growing season and resistance to powdery mildew disease in some oriental tobacco varieties and lines of the type Prilep in Pelagonia tobacco producing region.

Key words: tobacco, oriental, type Prilep, varieties, lines, morpho-biological characteristics

НЕКОИ МОРФОЛОШКИ И БИОЛОШКИ КАРАКТЕРИСТИКИ НА НОВОСОЗДАДЕНИ ОРИЕНТАЛСКИ СОРТИ И ЛИНИИ ТУТУН ОД ТИПОТ ПРИЛЕП

Морфолошките карактеристики на растенијата од една сорта тутун (висина на растенијата, број, димензии и форма на листовите) и должината на вегетациониот период како биолошко својство овозможуваат на прв поглед фенотипско распознавање на истата во однос на другите сорти. Исто така и отпорноста на една сорта тутун кон одредени болести е биолошка особина на самиот генотип. Фенотипската изразеност на сортата, е резултат на взаемното дејство (интеракцијата) на генотипот и влијанието на условите на надворешната средина во која растат и се развиваат растенијата.

Имајќи ги во предвид овие сознанија си поставивме за цел во овие истражувања да ги проучиме некои морфолошки карактеристики, должината на вегетациониот период и отпорноста спрема пепелницата на неколку ориенталски ароматични сорти и линии тутун од типот прилеп во производните услови на пелагонискиот реон.

Клучни зборови: тутун, ориенталски, тип прилеп, сорти, линии, морфо-биолошки својства.

INTRODUCTION

Tobacco crop is easily adaptable to different soil and climate conditions, which is confirmed by its wide area of distribution. Still, the distribution of any type or variety of tobacco is limited by the soil and climate

conditions (Atanasov D.1962, Uzunoski M.1985). Typical morphological and biological characteristics of tobacco variety or line (plant height, number, size and shape of leaves, length of vegetation period and uni-

formity of flowering) can be fully expressed only in certain environmental conditions and by application of all necessary cultural practices. Therefore, the reaction to any disease can be also estimated because it depends of local climatic conditions, variety resistance and site selection and rotation (Tobacco Research Board Kutsaga, 2016). The optimum phenotypic expression of typical morphological characters in oriental tobacco varieties and lines enable maximum use of their bio-

logical potential, resulting in a high-quality tobacco production recognizable in the market (Gornik R. 1973, Dimitrieski M. 1995). With regard to this, the main goal of our research was to analyze some of the morphological characters, the length of the vegetation period and mildew resistance in several varieties and lines of Prilep oriental tobacco in the producing region of Pelagonia (R. Macedonia).

MATERIAL AND METHODS

Subject of this research were four newly created tobacco varieties and lines resistant to powdery mildew: Prilep112-2/ 1 (Photo 1.), P l. 65/R (Photo 2.), P l.123 82, P l.301 65, and standard P12-2/1.

The newly created resistant lines were obtained by intraspecies hybridization, using foreign resistant varieties and domestic non-resistant oriental varieties and lines as its components. They are genetically stable and consolidated in terms of plant height and leaf number, shape and size.

In 2013 comparative trial was set up in randomized block design with four replications and transplanting was done at 40cm x 15cm spacing. Usual cultural practices, necessary for normal growth and development of oriental tobacco were applied on transplanted tobacco in field. The necessary morphological measurements and phenological observations were also carried out. Investigations of resistance to powdery mildew in some varieties of tobacco type Pri-

lep were made in the Small Biolab of Tobacco Institute-Prilep during 2013. Disease intensity was assessed on the basis of total number of observed plants and the number of diseased plants (leaves). Observation was made in two occasions: on 06 . 10. 2013 and 19.10. 2013.i.e. when intensity of disease attack in the susceptible varieties was the highest. For estimation of the intensity, the scale with a range 0-5 was used (EPPO,1997). Index of the disease was estimated by the formula of Mc. Kinney (cit. Dimitrieski M. et al. 2006, Miceska G. et al. 2006). According to the symptoms developed in plants and the intensity of attack, all the varieties investigated were classified into 6 categories:

- 0-Highly resistant- up to 0 % infection
- 1-Resistant - up to 1 %
- 2-Moderately resistant-1-5%
- 3-Poorly susceptible -5-20 %
- 4-Susceptible -20-40 %
- 5-Highly susceptible - 40-100%

RESULTS AND DISCUSSION

Morphological characteristics

The presented data show that the average values for the height of the stalk with inflorescence in tobacco lines and varieties investigated (Table 1) vary from 52.35 cm in the standard variety P12-2/1 to 75.48 cm in line P. l.123 82. Variability of this char-

acter is small, which can be seen from the degree of the root-mean square deviation ranging from $S = 0.78$ cm (P l. 301 65) to $S = 2.47$ cm (P l. 123 82). According to the obtained coefficient of variation, the root-mean square deviation of variants in rela-

tion to the average of the mean arithmetic value ranges from CV = 1.11% (P 112-2/1) to CV = 4.32% (P l. 123 82). The number of leaves in the studied lines and varieties varies from 34.5 in P 12-2/1 to 58.35 in the line P l. 123-65/8. The variability of this character is also small, which can be seen from the degree of the root mean-square de-

viation ranging from S = 0,43 (Prilep 112-2/1) to S = 1.05 (P l. 301 65). According to the obtained coefficient of variation, the root-mean square deviation of variants in relation to the average mean arithmetic value ranges from CV = 1.50% (P l. 123 82) to CV = 4.15% (P 12-2/1).

Table 1. Plant height and leaf number per plant

| Varietes Lines | Plant height with inflorescence | | | Leaf number per plant | | |
|-------------------|---------------------------------|------------|------|-----------------------|------------|------|
| | X | S ± Ss | CV% | X | S ± Ss | CV % |
| P12-2/1 Ø | 52,35 | 0,81± 0,18 | 1,52 | 34,50 | 0,76± 0,17 | 4,15 |
| Prilep112-2/1 | 55,20 | 0,86± 0,19 | 1,11 | 52,34 | 0,43± 0,10 | 3,25 |
| P l. 65/R | 68,26 | 0,79± 0,17 | 1,24 | 54,20 | 0,73± 0,16 | 1,82 |
| P l.123 82 | 75,48 | 2,47± 0,56 | 4,32 | 58,35 | 0,75± 0,17 | 1,50 |
| P l.301 65 | 64,40 | 0,78± 0,17 | 1,45 | 50,84 | 1,05± 0,23 | 2,45 |

X – mean value (cm/leaf number.); S–standard deviation; Ss – standard deviation error; CV- coefficient of variation %

Dimensions of the largest leaf (Table 2) vary from 19.52 cm length and 9.35 cm width (P l.123-65 / 8) to 22.30 cm length and 10.31 cm width in line P l. 301 65. The degree of the root-mean square deviation for this character ranges from S = 0.68 cm (P 12-

2/1) to S = 0.85 cm (P 112-2 / 1). The value of the coefficient of variation varies from CV = 2.28% (P l. 65 P) to CV = 3.67% (P l. 123 82), which indicates low variability in relation to the dimensions of leaves, too.

Table 2. The largest leaf size

| Varietes Lines | Length cm | | | Width cm | | |
|-------------------|-----------|------------|------|----------|------------|------|
| | X | S ± Ss | CV% | X | S ± Ss | CV % |
| P12-2/1 Ø | 21,15 | 0,68± 0,15 | 2,65 | 10,15 | 1,04± 0,23 | 5,42 |
| Prilep112-2/1 | 20,64 | 0,85± 0,19 | 3,45 | 9,61 | 0,78± 0,17 | 6,05 |
| P l. 65/R | 20,35 | 0,79± 0,17 | 2,28 | 10,27 | 0,84± 0,19 | 4,78 |
| P l.123 82 | 19,52 | 0,81± 0,18 | 3,67 | 9,35 | 0,68± 0,15 | 5,11 |
| P l.301 65 | 22,30 | 0,77± 0,17 | 2,97 | 10,31 | 0,74± 0,16 | 3,55 |

X – mean value (cm); S–standard deviation; Ss – standard deviation error; CV- coefficient of variation %

BIOLOGICAL CHARACTERISTICS

The length of the growing period (Table 3) is specific biological character of all varieties of tobacco, which varies in each variety depending on the environmental conditions and the cultural practices applied. All the

varieties and lines included in the investigation are uniform with regard to the length of the flowering period. The shortest growing period of 56 days to 50% flowering has the standard variety P12-2/1 and the longest pe-

riod of 81 day has the line P 1. 301 65. The growing season from planting to the end of harvest is 115 days for varieties P12-2/1

and Prilep 112-2/1 to 130 days for the line P 1. 301 65

Table 3.Length of the growing season

| Varietes Lines | Days from planting to: | |
|-------------------|------------------------|--------------------|
| | 50% flowering | End of the harvest |
| P12-2/1 Ø | 56 | 105 |
| Prilep112-2/1 | 64 | 115 |
| P 1. 65/R | 67 | 125 |
| P 1.123 82 | 71 | 125 |
| P 1.301 65 | 81 | 130 |

Data on the resistance of investigated varieties to powdery mildew are presented in Table 4. According to the two observations on this biological character, they showed different resistance to this pathogen. Thus, three of the 5 tested varieties and lines of

Prilep tobacco showed high resistance to the powdery mildew (P 1. 65/R, P 1.123 82 and P 1.301 65), one was resistant (Prilep112-2/1) and the standard variety P12-2/1 was highly susceptible.

Table 4. Resistance to powdery mildew in some varieties of Prilep tobacco

| Varietes Lines | Disease intensity | | | Resistance |
|-------------------|-------------------|---------------|---------|----------------------|
| | I estimation | II estimation | Average | |
| P12-2/1 Ø | 58,24 | 54,90 | 56,57 | Highly susceptible |
| Prilep112-2/1 | 2,82 | 3,45 | 3,14 | Moderately resistant |
| P 1. 65/R | 0,00 | 0,38 | 0,19 | Resistant |
| P 1.123 82 | 0,00 | 0,00 | 0,00 | Higly resistant |
| P 1.301 65 | 0,00 | 0,00 | 0,00 | Higly resistant |

0-Higly resistant- up to 0 % infection; 1- Resistant - up to 1 %; 2- Moderately resistant-1-5%; 3- Poorly susceptible -5-20 %; 4- Susceptible-20-40 %; 5- Highly susceptible – 40-100 %



Foto 1. Prilep112-2/1



Foto 2. P 1. 65 / R

CONCLUSIONS

The investigations on morphobiological characteristics of some oriental aromatic varieties and lines of Prilep tobacco in producing conditions of the Pelagonia region lead to the following conclusions:

- With regard to the morphological characters plant height, leaf number per plant and the largest leaf size, the investigated varieties and lines are phenotypically uniform and stable, with negligible variability expressed through the coefficient of variation $CV < 10\%$.
- Regarding the length of flowering stage, all investigated varieties and lines are highly uniform. The shortest growing season of 56 days to 50% flowering was observed in standard variety P12-2/1 and the longest season of 81 days in line P I. 301 65. The

growing season from planting to the end of harvest was 115 days in varieties P12-2/1 and Prilep 112-2/1 to 130 days in line P I. 301 65.

- Two of the five investigated varieties and lines of Prilep tobacco were highly resistant to powdery mildew (P I.123 82 and P I.301 65), one was resistant (P I. 65 / R), one was moderately resistant (Prilep112-2/1) and the check variety P12-2/1 proved to be highly susceptible.

As a general conclusion, it may be stated that the newly created varieties and lines can find application in mass production, and the two highly resistant lines of oriental tobacco can be used as genetic component in crossing, to create new varieties resistant to mildew.

REFERENCES

1. Атанасов Д. 1962. Тютюнопроизводство. Пловдив.
2. Горник Р. 1973. Облагородување на тутунот. Прилеп
3. Димитриески М. 1995. Ефекти на ласерската светлина врз приносот и квалитетот на тутунот. докторска дисертација, Скопје.
4. Dimitrieski M., Miceska G., Taskoski P., Gveroska B., 2006. Investigations on the Resistance of Some yaka Tobacco Lines and Varieties to Powdery Mildew. Rasteniievídni nauki / Plant science, Vol.XLII, No 6, p. 521-522. Nacionalen centŕ za agrarni nauki / National centre for agrarian sciences, Sofia. 70 Anniversary of Plant Protection Institute and Annual Balkan Week of Plant Health, 28-31.5.2006
5. EPPO Standards, 1997. Fungicides &Bactericides, Vol 2, March, Paris, France
6. Miceska G., Dimitrieski M., Taskoski P., Gveroska B., 2006. Resistance of Some Varieties and Lines of Tobacco Type Prilep to Powdery Mildew. Rasteniievídni nauki / Plant science, Vol.XLII, No 6, p. 519-520. Nacionalen centŕ za agrarni nauki / National centre for agrarian sciences, Sofia. 70 Anniversary of Plant Protection Institute and Annual Balkan Week of Plant Health, 28-31.5.2006
7. Tobacco Research Board Kutsaga, 2016. Climate change and the resistance of some pests and diseases. www.kutsaga.co.zw