Bulgarian Journal of Agricultural Science, 21 (No 6) 2015, 1211-1215
Agricultural Academy

BIOLOGICAL AND ECONOMIC ASSESSMENT OF NEW LINES BURLEY TOBACCO

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Abstract

DYULGERSKI, Y., Tz. RADUKOVA and St. KIRKOVA, 2015. Biological and economic assessment of new lines Burley tobacco. *Bulg. J. Agric. Sci.*, 21: 1211–1215

Examined are the biological and economic parameters of seven newly created lines of burley tobacco. Research results show that with the best biological assessment presents Line 1468, followed by a line 1472. Line 1468 gives the highest yield per hectare as an average over the period of study and three years of study. It also exhibited stability in terms of yield. Line 1488 gives the highest percentage of first class, as average for the period of study and for the three years of study. Therefore, no high yield which is obtained from it can essentially be used in breeding programs, as a donor of a high quality. All new created lines strongly outweigh the testimony of the standard variety, both in terms of production and in terms of percentage of class, which is an indication of the success of the selection work. Because shown favorable complex of biological and economic indicators Line 1468 should be proposed for production testing and for recognition as a new variety of Burley tobacco.

Key words: Burley tobacco, new created lines, biological indicators, economic parameters

Introduction

Burley tobacco is a representative of the large-leaf tobacco, which occupy an increasing part of the total tobacco production in Bulgaria (Zaprianova, 2006). Burley tobacco is sought by manufacturers because of its low labor intensity; relatively ease of manufacturing and satisfactory income (Palmer et al., 2007). The Yield and the quality of produced tobacco in the country significantly inferior to that in traditional producing countries. The unsatisfactory situation of production of this tobacco in our country is a serious obstacle for greater expansion of cultivated areas (Bozukov, 2012).

At this stage are grown number of indigenous and introduced varieties, but mainly it is Burley 1000, Burley 1317 and Burley 420 (Chinchev and Stoyanov, 1991; Apostolova and Stoyanov, 1999). Implemented currently in production Burley varieties not satisfy the contemporary requirements, nor farmers, nor the cigarette industry.

One of the main reasons for this is inefficient varietal structure. Studies show that imported tobacco Burley outperforms our samples of this variety group. The local tobacco can hardly be equivalent substitutes of imported in cigarette blends (Docheva and Stoilova, 2011; Kirkova, 2005; Milanova and Kirkova, 2012; Nicolova and Drachev, 2006; Popova et al., 2006).

Unsatisfactory situation of the Burley tobacco requires the creation and implementation of new higher - yield and higher-quality varieties (Calvert et al., 2000; Gveroska et al., 2013; Risteski et al., 2012). This indicates that must be fought hard, selection-research to improve the varieties of burley tobacco in the establishment and implementation of new highly effective varieties (Wilkinson et al., 2002).

The purpose of this study is to evaluate the most important biological and economic indicators new lines of Burley tobacco and the possibilities for their use in selection programs, as well as a possible submission of the best of them for production testing and recognition, new varieties of Burley tobacco.

Materials and Methods

For the achievement of defined goal for the period 2011-2013 in experimental field s of TTPI - Markovo are tested eight samples of Burley tobacco, namely: Line 1468, Line

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1472, Line 1488, Line 1493, Line 1449, Line 1538, Line 1548 and Pliska variety 2002 used to standards in Burley tobacco. Subject of research and analysis are the most important biological and economic parameters in Burley tobacco. Of the biological parameters are researched: plant height, number of leaves, length and width of 7-8 leaf which correspond to size of the leaves of the lower harvesting belt; length and width of 13-14 leaf, respectively, for an mid harvesting belt. Estimated is the length of the vegetative period. Dimensions are 120 plants from the option. Of economic indicators are calculated yield per hectare and percentage of first, second and third class.

All the options apply a uniform technology of cultivation. The drying is performed in a heating base TTPI. Field trials are set according to the methodology of Zapryanov and Dimova (1995).

Year in which the study is carried out (2011-2013) differ in amount of rainfall fell in the period from planting to harvesting of burley tobacco. And in three years, rainfall is very unevenly distributed. In 2011 it is twice over the norm in August, and in 2013 through June. And for the three years of study amount of rainfall for all other months of the vegetation is very below the norm, at least it is in 2012.

Fall precipitations during the three years of study are inadequate for the growth and development of tobacco. Values of daily average temperatures are almost identical in the three experimental years are optimal for growing Burley tobacco.

Mathematical treatment of the data is made to the accompanying products SPSS 20. Experimental data are processed by a process of analysis of variance (Anova), a difference between the variant are established by of many ranking test of Dunkan (1995).

Results and Discussion

Biological assessment

Average for the period of study with the highest values for plant height is presented control variety Pliska 2002 (Table 1). With little difference unlike him with almost identical results are Line 1468 and Line 1488. There are no significant differences between the readings of the options. All of these values present height of the plants that are optimal for the Burley tobacco.

In unison with the plant height highest number of leaves during the reporting period developed Line 1468, Line 1488 and Pliska variety (Table 1). The greatest number of plant leaves is obtained from Line 1468, as only this variant gives 28 leaves. Although the testimonies of variations in the number of leaves are not optimal, however they all satisfy the requirements of Burley tobacco on this indicator.

The greatest length of the leaves from the lower harvesting belt (7-8 leaf) presents Liniya1468, followed by line 1472 (Table 1). Values of these two lines are optimal for standard in Burley tobacco. Readings and other options satisfy the requirements of Burley tobacco.

The results for the mid harvesting belt largely correspond to those of the lower harvesting belt. The greatest length of the leaves from the mid harvesting belt (13 - 14 leaf) presents Line 1468, followed by Line 1472 (Table 1). Likewise Line 1468 gives and leaves with the greatest width followed a slightly different from Line 1472.

Other options give satisfactory results in terms of length and width of leaves in the middle harvesting belt.

Line 1468 is characterized by the most favorable and optimal sizes of leaves from the lower and middle harvesting belt.

As regards the length of the vegetative period there is a significant difference between the variants. All tested variants have a shorter vegetative period than the control variety (Table 1). With the shortest while most favorable vegetation period is characterized Line 1472. Quite favorable vegetative period develops and Line 1468. Line 1538 and especially Pliska variety present too long for Burley tobacco vegetative period. For the rest of the variant its length is satisfactory values.

No significant variation in the biological parameters in the variant experienced over the years of study.

For biological indicators with the best estimate is characterized Line 1468. Beneficial for Burley tobacco are reading and Line 1472.

Economical assessment

From the data on the two-factor dispersion analysis shows that the average for the study period Line 1468 gives the highest yield per hectare (Tables 2 and 3). At proven difference its results strongly outperforms those of the next rankings in yield per hectare, namely Line 1472. Yield of Line 168 exceeds this standard variety with almost 43%. Only by this line is obtained over 3000 kg per hectare and therefore can be defined as a high-yield.

Line 1468 gives with evidence of a difference the highest yield and the three years of study. This variant exhibits stability for the yield.

In the second place is Line with evidence of a difference from other variants. It gives 3000 kg / ha and also ranks second in production and in the three years of study. Among other the variants in the study demonstrated no proven difference in yield, but they excel the standard variety. The lowest yield presents the standard variety Pliska 2002 (Table 3).

Table 1
Dispersion analysis of biological indicators of the tested variants in years and average for the period of study

Variants	Height of plants, sm	Number of leaves	Length of 7-8 leaf, sm	Width of 7-8 leaf, sm	Length of 13-14 leaf, sm	Width of 7-8 leaf, sm	Length of vegetative period
2011							
L 1468	167.625b	28.05a	62.87a	32.0925b	64.55a	34.3175a	75.075d
L 1472	164.975cd	26.825b	62.0025b	32.7925a	62.11b	32.085c	72.975e
L 1488	167.275bc	27.375b	58.3725c	31.6475b	61.1975c	32.7775b	79.825c
L 1493	164.7d	25.4c	59.165c	30.265d	59.18de	29.5275d	80.6c
L1449	160.275ef	25.3c	56.8525d	29.9475d	58.795e	29.125d	80.25c
L1538	162.275e	25.675c	56.5d	27.725f	59.5075d	29.34d	84.525b
L 1548	158.675f	25.875c	57.3025d	28.7075e	58.9725de	28.4425e	80.7c
Pliska	173.55a	27.4b	61.355b	30.855c	60.91c	28.36e	87.225a
$LSD_{5\%}$	9.45	2.53	3.2	2.32	2.21	1.88	3.27
2012							
L 1468	167.625b	28.05a	62.87a	32.0925b	64.55a	34.3175a	75.075d
L 1472	164.975cd	26.825b	62.0025b	32.7925a	62.11b	32.085c	72.975e
L 1488	167.275bc	27.375b	58.3725c	31.6475b	61.1975c	32.7775b	79.825c
L 1493	164.7d	25.4c	59.165c	30.265d	59.18de	29.5275d	80.6c
L1449	160.275ef	25.3c	56.8525d	29.9475d	58.795e	29.125d	80.25c
L1538	162.275e	25.675c	56.5d	27.725f	59.5075d	29.34d	84.525b
L 1548	158.675f	25.875c	57.3025d	28.7075e	58.9725de	28.4425e	80.7c
Pliska	173.55a	27.4b	61.355b	30.855c	60.91c	28.36e	87.225a
$LSD_{5\%}$	9.45	2.53	3.2	2.32	2.21	1.88	3.27
2013							
L 1468	166.275a	28.2a	61.64a	32.8a	63.5925a	34.19a	74.925e
L 1472	166.5a	26.9b	60.3825b	32.3175a	62.0175b	33.425b	72.775f
L 1488	167.25a	27.35b	58.6325c	31.5375b	60.86c	31.5875c	79.675d
L 1493	165.55a	25.45c	57.1525e	28.845d	59.1825de	29.92d	79.75d
L1449	161.9b	25.075c	56.355f	28.33de	58.705e	29.045e	79.925d
L1538	162.075b	25.55c	57.6325de	28.21e	58.7575e	29.125e	84.675b
L 1548	161.375b	25.275c	58.08cd	28.2275e	59.3975d	28.7225e	81.825c
Pliska	166.7a	27.175b	60.035b	30.875c	60.555c	27.945f	87.525a
$LSD_{5\%}$	9.38	2.59	3.2	2.07	2.28	2.15	2.99
Avarage for the period							
L 1468	167.5917ab	27.94167a	62.45417a	32.39167a	63.89667a	33.99083a	75.05833e
L 1472	165.9b	26.8166c	61.23167ab	32.59417a	62.16333b	33.26583ab	72.60833f
L 1488	167.1167ab	27.38333b	57.995c	31.815ab	61.14917c	32.34583b	79.59167d
L 1493	165.35b	25.40833d	57.65083c	29.4425c	59.54417d	29.84583c	80.675cd
L1449	161.1333c	25.45d	56.87667c	28.86417cd	58.6925e	28.64833de	80.2cd
L1538	161.4917c	25.55d	56.96583c	28.02167d	59.06167de	29.32167cd	83.98333b
L1548	159.975c	25.48333d	57.14667c	28.34083d	59.12917de	28.50833de	80.94167c
Pliska	169.7167a	27.325b	60.97083b	31.14083b	61.20583c	28.04833e	87.24167a
$LSD_{5\%}$	16.91	4.45	5.83	3.95	4.08	4.05	5.76

Table 2
Analysis of variance for cured tobacco yield

Source of Variation	Sum of Square	df	Mean Square	Sig of F	n, %
Variants	338854.51	6	56475.7	0.000	99.6*
Years	1.526	2	0.763	0.908	0.0004
2-Way Interactions	2.284	12	0.19	0.000	0.0007*
Residual	1161.82	147			
Total	1039194.361	167			

*p≤0.05

Table 3
Dispersion analysis of economical parameters of the tested variants in years and average for the period of study

Years of study																
Variants	2011				2012				2013				Average for the period			
	Cured tobacco yield, kg /ha	Quality of cured tobacco, %			Cured tobacco yield, kg /ha	Quality of cured tobacco, %			Cured tobacco yield, kg /ha	Quality of cured tobacco, %			Cured tobacco yield, kg /ha	Quality of cured tobacco, %		
		I class	II class	III class		I class	II class	III class		I class	II class	III class		I class	II class	III class
L 1468	3145[a]	33.75	54.5	11.25	3260[a]	30.5	55.5	14	3307.5[a]	33	55.5	11.5	3237.5[a]	32.41667	55.16667	12.25
L 1472	3002.5[b]	32.25	51.5	16.25	2970[b]	32.5	51.5	16.25	3030[b]	30	50.75	19.25	3000.83[b]	31.58333	51.25	17.25
L 1488	2762.5[c]	41.75	49.75	8.5	2742.5[c]	41.25	49.25	9.5	2832.5c	40	48.25	11.75	2779.17[c]	41	49.08333	9.916667
L 1493	2660[c]	32	50.25	17.75	2747.5[c]	27.5	49.75	22.75	2697.5[c]	31.75	49.25	19	2701.67[d]	30.41667	49.75	19.83333
L 1449	2665[c]	30.25	50.25	19.5	2705[c]	29.5	50.75	19.75	2682.5[c]	31.5	50	18	2684.17[d]	30.41667	50.33333	19.08333
L 1538	2690[c]	28.75	48.75	22.5	2690[c]	31.5	51	17.5	2677.5[c]	30.75	50.75	18.5	2685.83[d]	30.33333	50.16667	19.5
L 1548	2732.5[c]	30.75	50.75	18.5	2642.5[c]	33.5	51.75	14.75	2692.5[c]	32.25	50	17.75	2689.17[d]	32.16667	50.83333	17
Pliska	2230[d]	11.25	70	18.75	2295[d]	10	71	19	2287.5[c]	9	75	18.5	2270.83[e]	10.08333	72	18.75
$LSD_{5\%}$	3.8				4.3				4.53				8.84			

All new created lines excel at yield the standard variety. This is an indication of the success of the selection work on this most important agronomic indicator.

Average for the period of study, the highest percentage of first class is obtained from the Line 1488 (Table 3). It is the only option that provides 40% first class for in his samples. As it is presented in the three years of study in the first place on this indicator, it can be concluded that exhibits stability in terms of quality. This line can be defined as a relatively high-quality. Because no high yield per hectare, however, cannot be offered for recognition as variety. It can be used in the breeding program as a donor for high quality finished products.

Secondly, but with a big difference from the first ranks Line 1468. With small variations of it are arranged Line 1472 and Line 1458. These three options give over 30% first classes in their samples (Table 3).

The standard variety Pliska 2002 provides the lowest percentage of first-class all tested variant. Only if it percentage of a third class exceeds that of the first class (Table 3).

Although the entire variant gave significantly higher percentage of first class than standard variety, the results of this indicator can be considered satisfactory because in all of them percentage of second-class exceeds that of the first (Table 3).

In a complex of biological and economic indicators Line 1468 stands out. Due developed optimal biometric indicators, favorable length of vegetative period, high stable yield per hectare and a satisfactory percentage of first class, this line deserves presented for manufacturing test.

All new created lines are highly superior to the readings of the standard variety, both in terms of yield and in terms of percentage of the classes. This shows that selection work in terms of economic parameters has achieved its goals.

Conclusion

- In our study samples of burley tobacco with the most favorable biological indicators is characterized Line 1468. With good evaluation is presented and Line 1472.
- Line 1468 gives the highest yield per hectare as an average over the period of study and for the three years of study.
- From Line 1488 is prepared highest percentage of first class, as average for the period of study and for the three years of study.
- All new created lines highly superior to the readings of the standard variety in terms of yield and in terms of percentage of the classes. This is an indication of the success of the selection work.
- The final results show that Line 1468 ranks first, with a complex of biological and economic indicators and should be proposed for production testing and recognition as a new variety Burley tobacco.

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Received February, 20, 2015; accepted for printing October, 5, 2015