RESULTS OF TRIAL PRODUCTION OF HANSKI 227 ORIENTAL TOBACCO VARIETY IN DAK LAK, VIETNAM IN 2022-2023 AND 2023-2024CROP SEASONS

ABSTRACT

With the goal of selecting Oriental tobacco varieties suitable for natural conditions in Vietnam, with potential for raw material quality and raw material production capacity in Vietnam, from 6 Oriental tobacco varieties originating from Bulgaria, the Tobacco Institute has been testing in Ninh Thuan province for 3 years from 2019 to 2021, in Dak Lak from 2021 to 2022. The results of the trial planting show that Oriental tobacco varieties have good growth rates, indicating that the soil and climate conditions in Ninh Thuan and Dak Lak provinces are quite suitable for the development of this type of tobacco. Through selection and evaluation, we have selected 2 Oriental tobacco varieties, Basma 16 and Hanski 227, which are promising and stand out from the other varieties. In which, Hanski 227 variety is evaluated to have outstanding prospects due to its good growth ability, high yield, characteristic aroma and good smoking properties, especially Hanski 227 variety has less harvested leaves, larger leaf size and mass than Basma 16 variety, so the labor costs for cultivation, harvesting and preliminary processing are lower. In order to evaluate the ability to expand raw material production and raw material quality, in 2023 and 2024, we will conduct a trial production of Oriental tobacco raw materials Hanski 227 variety in Dak Lak, with a fertilizer level of 50N + 30P2O5 + 80K2O (with N (NH4NO3), P (Ca(H2PO4)2) and K (K2SO4)), on a planting density of 110,000 trees/ha. The trial production results show that: Hanski 227 variety has good growth, high yield, good quality (yield reaches 1.52 - 1.66 tons/ha, nicotine content 0.81 - 1.38%, reducing sugar 8.9 - 12.1%), the raw material has a characteristic aroma and good smoking properties. Based on the trial production results, it shows that Oriental tobacco Hanski 227 grown in Dak Lak has good growth ability, good quality raw material and has the same quality as Oriental tobacco imported from Bulgaria, Türkiye and Greece. Therefore, Dak Lak is considered a region that can produce good quality Oriental tobacco in Vietnam with the tested fertilizer formula and planting density and the Hanski 227 variety is considered suitable here, with advantages in productivity and lower production costs due to having fewer and larger leaves than the Basma 16 variety. In 2025, we will produce Oriental tobacco raw materials Hanski 227 in Dak Lak on an expanded scale and complete the preliminary processing process, with the goal of producing Oriental tobacco raw materials domestically, with appropriate production costs.

***Keywords**: Oriental tobacco, trial production, Hanski 227, Dak Lak.*

INTRODUCTION

Oriental tobacco is grown worldwide for the purpose of blending raw materials that provide a characteristic natural aroma [1]. Oriental tobacco raw materials have a much milder flavor, lower nicotine and reducing sugar content than other tobacco varieties [2]. Oriental tobacco is a small-stemmed, small-leafed plant; requires a lot of manual labor; is planted at high density; grows in hot climates, with temperatures gradually increasing at the end of the season and low air humidity; is dried in the sun; is harvested by hand because the leaves are small; the leaves have a natural aroma and are elastic, suitable for blending American mixed tobacco tastes.

Oriental tobacco is widely grown in some major countries such as Turkey, Greece, North Macedonia and Bulgaria. In countries that produce Oriental tobacco, the soil has a significant impact on quality. The soils suitable for Oriental tobacco are usually poor in nutrients, low in humus and low in yield, but the tobacco leaves are of good quality and very aromatic. Tobacco grown on deep tillage soils, clay to loam, and rich in nutrients gives high yields, but is less aromatic. Oriental tobacco is generally grown on soils with low fertility, especially at low N levels when the plants are mature. Aroma is an important factor in the quality of the product. It largely depends on the terrain and climatic conditions where they are grown.

Every year, Vietnam usually imports about 1,000 tons of Oriental tobacco for blending and cigarette production. Currently, Vietnam does not have any Oriental tobacco growing areas to serve the domestic tobacco production needs. To develop Oriental tobacco in Vietnam, the Vietnam Tobacco Institute has imported 6 varieties from Bulgaria for testing in Ninh Thuan and Dak Lak since 2020, such as Basma 16, Basma H, Kozarsko 339, Hanski 227, Dupnitsa 733, and Rila 89 [3]. The results showed that the dry leaf yield of the varieties grown in Ninh Thuan and Dak Lak is equivalent to the yield grown in Bulgaria. The dry tobacco has a fairly high ratio of grade 1+2 leaves (the highest ratio of good leaves). Sensory evaluation shows that the quality of raw materials of the varieties has high technological value, such as color, elasticity, color intensity, and aroma of Oriental tobacco. The nicotine content in the varieties grown in Vietnam is much lower (2-3 times) than that of the varieties grown in Bulgaria. Based on some of the above research results, we have selected the Oriental Hanski 227 tobacco variety with high yield and good quality for trial production of raw materials in Dak Lak province in 2023 and 2024.

MATERIALS AND METHODS

Research site

The trial cultivation of Oriental tobacco Hanski 227 was conducted in Ea Sup district, Dak Lak province - Vietnam from December 2022 to May 2023 and 2024. This trial production site has suitable climate and soil conditions for Oriental tobacco production.

Soil analysis data in Dak Lak, total N: 0.49-1.09 mg/g, P2O5: 0.02-0.07%, and K_2O: 0.06-0.52%. The available N (mg/100 g of soil): 4.36-7.8, P2O5: 4.51-39.96 and K2O: 3.45-15.39; total organic matter: 0.52-1.41% and pH_{KCL}: 4.56-7.04, and chlorine is 7-33 ppm.

Materials and research objects

Tobacco variety Oriental Hanski 227; planted with fertilizers N: NH_4NO_3, P: Ca $(H_2PO_4)_2$ and K: K_2SO_4.

Experimental design

Seeds of tobacco variety Oriental Hanski 227 were sown in a disease-free nursery. After reaching 4 - 6 leaves, seedlings were planted in 03 production fields, with an area of each field = 2,000 m^2, with a total area = 6,000 m^2/ crop

Planting density: planting density of Hanski 227 variety 110,000 plants/ha with a distance of 50 cm x 17 cm.

Fertilizer level: Based on the results of soil analysis and research results in 2021 - 2022 in Dak Lak, we have selected the fertilizer level of 50N + $30P_2O_5$ + $80K_2O$

Monitoring content

Cultivation, care and preliminary processing according to the technical process provided by the Bulgarian Tobacco and Tobacco Products Institute, with adjustments to suit the conditions of Vietnam.

Evaluate the growth characteristics, pest and disease levels, and productivity of Oriental tobacco varieties based on a number of monitoring indicators, with reference to QCVN 01-85:2012/BNN&PTNT (National technical regulation on testing the cultivation value and use of dried yellow tobacco varieties).

Evaluate the quality of raw materials:

+ Classify raw tobacco into 3 main types based on the Bulgarian tobacco classification document "National Standard 9271-85".

+ Analyze some main chemical components affecting the quality of raw materials at the Tobacco Institute Analysis Department such as: Nicotine according to TCVN 7103:2002 (ISO 2881:1992), total nitrogen according to TCVN 7252:2003, reducing sugar according to TCVN 7102:2002 (CORESTA 38:1994), Chlorine according to TCVN 7251:2003

+ Evaluate quality based on Draft TCVN: Oriental raw tobacco - sensory evaluation by scoring method.

Statistical processing of data according to common methods, using computer programming such as EXCEL.

RESULTS AND DISCUSSION

Trial production of Oriental tobacco Hanski 227 variety in Dak Lak in the 2022-2023 and 2023-2024 crop seasons

- Growth period of Oriental Hanski 227 tobacco trial production in Dak Lak in the 2022-2023 and 2023-2024 crop seasons

In order to evaluate the prospects of raw material quality and the ability to expand production with Oriental Hanski 227 tobacco variety in Dak Lak, in the 2022-2023 and 2023-2024 crop seasons, the project will carry out trial production of raw materials. Monitoring the growth period of Oriental tobacco variety in Dak Lak gave the results as shown in Table 1.

Table 1. Growth period of Oriental tobacco variety Hanski 227 trial production in Dak Lak in the 2022-2023 and 2023-2024 seasons

Crop	Experimental field	Time from planting to (days)		
		50% buds of plants	*First ripe leaf*	*Last harvesting leaf*
2022-2023	Manufacture 1	67	62	100
	Manufacture 2	66	63	101
	Manufacture 3	65	65	99
	Medium	**66,0**	**63,3**	**100,0**
2023-2024	Manufacture 1	59	57	95
	Manufacture 2	60	58	95
	Manufacture 3	60	57	95
	Medium	**59,7**	**57,3**	**95,0**

Time from planting to 50% of plants budding: the trial production fields of Hanski 227 variety in the same season have not much difference in maturation time, from 65-67NST (day after planting) in the 2022-2023 season and 59-60NST in the 2023-2024 season. The maturation time of Hanski 227 variety in the 2023-2024 season (59.7NST) is about 6 days earlier than in the 2022-2023 season (66NST). This can be explained by the fact that the weather conditions in the 2023-2024 season have a higher average temperature than in the 2022-2023 season, so the plants can maturation earlier.

Time from planting to first leaf ripening: Oriental Hanski 227 variety grown in Dak Lak has no difference in time from planting to first leaf ripening in plants of trial production fields in the same crop season, at 57-58 NST and 62-65 NST. The 2022-2023 crop season (63.3 NST) ripens later than the 2023-2024 crop season (57.3 NST) with a small time difference, with a difference of about 6 days.

Time from planting to final harvest: similar to the time of vegetative development and first leaf ripening, the time from planting to final harvest of plants in trial production fields is similar in the same crop season, 95 NST in the 2023-2024 crop season and 99 - 101 NST in the 2022-2023 crop season. The trial production fields of Hanski 227 variety in the 2022-2023 crop (100 chromosomes) have a total growth period longer than in the 2023-2024 crop (95 chromosomes) by about 5 days.

Thus: The time of vegetative development, first leaf ripening and final harvest of plants in the trial production fields of the same variety is not much different when planted in Dak Lak in the same crop and the 2022-2023 crop is 5-6 days longer than in the 2023-2024 crop, this can be explained by the fact that in the 2023-2024 crop, the average KK temperature is 2-3oC higher than in the 2022-2023 crop and the Oriental Hanski 227 tobacco variety is quite sensitive to temperature conditions.

- Growth rate of Oriental Hanski 227 tobacco variety produced on trial in Dak Lak in the 2022-2023 and 2023-2024 seasons

Regarding biological plant height: Plants in the production fields of Hanski 227 variety in the 2022-2023 and 2023-2024 seasons (142.8 - 146.0 cm) have different biological plant heights, however the difference is not much. Plants in the 2023-2024 season have an average biological height higher than the average plant height in the 2022-2023 season.

Table 2. Some growth indicators of Oriental Hanski 227 tobacco variety produced on trial in Dak Lak in the 2022-2023 and 2023-2024 seasons

Crop	Experimental field	Biological tree height (cm)	Height of the tree (cm)	Bio-high Topping Total (leaf)	Body diameter (cm)
2022-2023	Manufacture 1	140,3	127,9	36,1	1,39
	Manufacture 2	145,0	129,7	36,0	1,38
	Manufacture 3	143,2	127,2	36,0	1,40
	Medium	**142,8**	**128,3**	**36,0**	**1,39**
2023-2024	Manufacture 1	148,0	132,7	36,0	1,45
	Manufacture 2	143,0	127,3	37,0	1,44
	Manufacture 3	147,0	131,3	37,0	1,41
	Medium	**146,0**	**130,4**	**36,7**	**1,43**

Regarding the total number of leaves: plants in the trial production fields of Hanski 227 variety have a total number of leaves at different levels, at a small level, 36.0 - 36.1 leaves/plant and 36-37 leaves/plant. Hanski 227 variety planted in Dak Lak in the 2022 - 2023 and 2023-2024 seasons have a similar average total number of leaves (36 - 36.7 leaves/plant).

Regarding the stem diameter: Plants in the trial production fields of Oriental tobacco Hanski 227 variety have a stem diameter at a small level, 1.38 - 1.40 cm in the 2022-2023 season and 1.41 - 1.45 cm in the 2023-2024 season. In summary: with the same fertilization level (50 kg N/ha), planting density (110,000 plants/ha) and the same external conditions, plants in the trial production fields of the tobacco variety Oriental Hanski 227 did not have differences in terms of vegetative development time, first leaf maturity, final harvest and some agronomic indicators in Dak Lak in the same crop season and there were insignificant differences between the 2022-2023 crop season and the 2023-2024 crop season. Monitoring the leaves representing the central leaf of the plant in the trial production fields of the Hanski 227 variety obtained the results as shown in Table 3.

Regarding the length of the central leaf: Plants in the trial production fields have different leaf lengths, however the difference is not large, from 31.6 - 32.9cm in the 2022-2023 crop season and 29.8 - 32.2 in the 2023-2024 crop season. The average leaf length in the 2022-2023 and 2023-2024 crop seasons has no difference (32.2 cm and 31.7 cm), this is one of the characteristics of the variety, shown in the research content in Dak Lak in previous crop seasons.

Regarding the width of the central leaf: similar to the length of the central leaf, the leaf width of the plants in the trial production fields of the Hanski 227 variety has different levels of error, but not much in the same crop season, from 19.6 - 20.3cm in the 2022-2023 crop season and from 20.7 - 21.6cm. The Hanski 227 variety has a leaf width (21.1cm) in the 2023-2024 crop season that is larger than that in the 2022-2023 crop season (19.8cm). In the 2023-2024 crop season in Dak Lak, the average leaf width is 1.3cm larger than that in the 2022-2023 crop season.

Table 3. Leaf size of Oriental Hanski 227 tobacco variety testedin Dak Lak in the 2022-2023 and 2023-2024 crop seasons

Crop	Experimental field	Leaf size (cm)

		Length	Width
2022-2023	Manufacture 1	32,9	19,7
	Manufacture 2	31,6	20,3
	Manufacture 3	32,2	19,6
	Medium	**32,2**	**19,8**
2023-2024	Manufacture 1	33,2	20,7
	Manufacture 2	29,8	21,6
	Manufacture 3	32,1	20,9
	Medium	**31,7**	**21,1**

In general: The growth rate of plants in the trial production fields of Oriental Hanski 227 grown in Dak Lak in the 2022-2023 and 2023-2024 seasons has a period of development, first leaf ripening, final leaf harvesting, some growth indicators such as: biological plant height, total number of leaves, size of leaves of the central region and stem diameter at the same level, if there is a difference, the difference is not large. Plants in the 2023-2024 season have a period of development, first leaf ripening, final leaf harvesting earlier than in the 2022-2023 season.

General assessment: Oriental Hanski 227 tobacco variety in the trial production content in Dak Lak in the 2022-2023 and 2023-2024 seasons has a good growth rate.

- Level of pests and diseases of the Oriental Hanski 227 tobacco variety produced on trial in Dak Lak in the 2022-2023 and 2023-2024 seasons

The level of pests and diseases of plants in the trial production fields of the Hanski 227 variety in Dak Lak in the 2022-2023 and 2023-2024 seasons is assessed as mild for pests, negligible damage from viral diseases, but the level of damage is mild to quite severe for black stem rot caused by fungi and bacterial wilt, with data as shown in Table 4.

Table 4. Level of pests and diseases of the Oriental Hanski 227 tobacco variety produced on trial in Dak Lak in the 2022-2023 and 2023-2024 seasons

Crop	Experimental field	The level of damage of the worm		Infection rate (%)			
		Green worm	*Bug*	*Black body*	*Bacterial wilt*	*Curly tip*	*Leaf mosaic*
2022-2023	Manufacture 1	-	-	19,5	15,5	-	-
	Manufacture 2	-	-	5,7	4,3	-	-
	Manufacture 3	-	-	17,2	12,8	-	-
	Medium	**-**	**-**	**14,1**	**10,9**	**-**	**-**
2023-2024	Manufacture 1	-	-	1,2	4,5	-	-
	Manufacture 2	-	-	1,5	5,5	-	-
	Manufacture 3	-	-	1,9	6,1	-	-
	Medium	**-**	**-**	**1,5**	**5,3**	**-**	**-**

Note: (-) The level of harm is negligible.

For pests: plants in the trial production fields of Hanski 227 variety in Dak Lak in the 2022-2023 and 2023-2024 seasons have green worms and aphids as the main objects. However, worms only appear on a few single plants and aphids appear at a low rate of infected plants and population density, causing light damage.

For diseases: Viral diseases (Curly shoot, TMV, CMV) appear, but at a low rate and level of damage, not significant. The main diseases appearing in the production fields are recorded as black stem caused by the fungus *Phytophthora parasitica* and wilt caused by the bacteria *Ralstoniasolanacmrum.*

- Black stem disease: The disease occurs about 40 days after planting, the diseased plants show signs of yellow wilting, the leaves turn yellow from the base to the top, when severe, the plants wilt yellow and die, the base of the stem and roots are dark brown. Depending on the field, the rate of diseased plants and the level of damage are different. In the 2022-2023 crop, the rate of diseased plants is 5.7 - 19.5% and in the 2023-2024 crop, the rate of diseased plants is from 1.2 - 1.9%. This is a mild level of damage (2023-2024 crop) to quite severe (2022-2023 crop). The disease mainly damages fields with high soil, the previous crop did not rotate with wet rice, planted upland crops, and has a large source of disease. - Bacterial wilt disease: similar to black stem disease, the disease occurs at the stage of 40-50 days after planting, when a few leaves on one side first appear, they wilt and turn green, then the entire plant turns yellow and dies. The disease occurs strongly in fields with high soil, many sources of disease, and no rotation with wet rice. Fields planted in the 2023-2024 crop have a diseased plant rate of 4.5 - 6.1%, with a mild level of damage, and fields planted in the 2022-2023 crop have a diseased plant rate of 4.3 - 15.5%, with a fairly severe level of damage.

In the 2022-2023 crop in Dak Lak, black stem and bacterial wilt diseases arose strongly and caused quite severe damage in the trial production fields of Oriental tobacco and were more severe than in the 2023-2024 crop. In addition, they also occurred and caused severe damage in fields producing dried yellow tobacco and Burley tobacco. This is an issue that needs attention for production investment companies and farmers in Dak Lak in the coming crop seasons regarding the prevention and control of diseases caused by fungi and bacteria.

In general, in Dak Lak in the 2022-2023 and 2023-2024 crop seasons, in the trial production fields of Hansk 227 variety, few pests and viral diseases appeared and the level of damage was mild, black stem and bacterial wilt diseases

appeared and the level of damage ranged from mild to quite severe, especially in the high-altitude fields, not rotated with wet rice, greatly affecting the yield, quality of raw materials and income of farming households.

- Yield and leaf ratio of grade 1+2 tobacco variety Oriental Hanski 227 trial production in Dak Lak in the 2022-2023 and 2023-2024 seasons

Number of harvested leaves: Plants of trial production fields of tobacco variety Oriental Hanski 227 in Dak Lak in the 2022-2023 and 2023-2024 seasons were left with the number of harvested leaves after cutting off the top and removing the base leaves, with the number of harvested leaves on the fields at nearly the same level, an average of 28.8 leaves/plant in the 2022-2023 season and 29.1 leaves/plant in the 2023-2024 season.

Table 5. Some indicators of yield, productivity and ratio of grade 1+2 leaves of Oriental Hanski 227 variety in trial production in Dak Lak in the 2022-2023 and 2023-2024 crop seasons

Crop	Experimental field	Number of harvested leaves (leaves)	Fresh leaf weight (g)	Fresh/dry leaf ratio	Yield(tons/ha)	Leaf ratio level 1+2 (%)
2022-2023	Manufacture 1	28,8	12,0	6,84	15,03	77,8
	Manufacture 2	28,7	11,3	6,78	15,50	78,8
	Manufacture 3	28,9	12,0	6,67	15,28	80,0
	Medium	**28,8**	**11,8**	**6,76**	**15,27**	**78,9**
2023-2024	Manufacture 1	28,7	11,0	6,14	18,40	84,6
	Manufacture 2	29,1	10,7	6,29	15,22	81,9
	Manufacture 3	29,5	10,7	6,35	16,33	84,4
	Medium	**29,1**	**10,8**	**6,26**	**16,65**	**83,6**

Fresh leaf weight of Basma 16: Plants in large-scale field trials had similar fresh leaf weights for each variety, reaching 5.0 - 5.7 g/leaf on Basma 16 and 11.3 - 12.0 g/leaf on Hanski 227. Fresh leaf weight of Basma 227 variety (11.8 g/leaf) had a larger leaf weight than Basma 16 variety (5.3 g/leaf). In the 2022-2023 crop season in Dak Lak, the average fresh leaf mass of the Chinese cassia variety was lower than in the 2021-2022 crop season by 0.8 g/leaf in the Hanski 227 variety and 2.2 g/leaf in the Basma 16 variety. Fresh/dry ratio: Plants in the trial production fields of the Hanski 227 variety had a fairly low fresh/dry ratio, at 6.67 - 6.84 kg fresh for 1.0 kg dry leaves in the 2022-2023 crop season and 6.14 - 6.35 kg fresh leaves for 1.0 kg dry leaves in the 2023-2024 crop season. Due to the dry and hot weather, the fresh/dry ratio of the 2023-2024 crop (average 6.26 kg fresh/1 kg dry) is lower than that of the 2022-2023 crop (average 6.76 kg fresh leaves/1 kg dry).

The data (Table 5) shows that the trial production fields of the Oriental Hanski 227 variety have different yields, but not much, the difference is mainly due to the different rates of black stem and bacterial wilt diseases in each field, the 2022-2023 crop has a yield of 15.03 - 15.50 quintals/ha and the 2023-2024 crop has a yield of 15.22 - 18.40 quintals/ha. In particular, the 2023-2024 crop of Hanski 227 variety has an average yield (16.65 quintals/ha) higher than the 2022-2023 crop (15.276 quintals/ha) by 9%, which can be explained by the lower incidence of black stem and wilt diseases and lower fresh/dry leaf ratio, etc.

Leaf ratio of grade 1+2: The dried medicinal leaves of the trial production fields of Hanski 227 variety have a leaf ratio of grade 1+2 at a similar level, with not much difference and are assessed at a fairly high level, reaching 77.8 - 80.0% in the 2022-2023 crop and 81.9 - 84.6% in the 2023-2024 crop. The Hanski 227 variety in the 2023-2024 crop (83.6%) has a higher percentage of level 1+2 leaves than in the 2022-2023 crop (78.9%) by 4.7% and this can be explained by the fact that in the 2022-2023 crop, especially the 2023-2024 crop, there was little rain, which was favorable for drying during the picking and drying stage.

- Evaluation of raw material quality of Oriental Hanski 227 tobacco variety trial produced in Dak Lak in the 2022-2023 and 2023-2024 crop seasons

- Chemical composition

Table 6. Chemical composition of Oriental Hanski 227 tobacco variety trial produced in Dak Lak in the 2022-2023, 2023-2024 crop seasons and imported samples

Samples	Nicotine (%)	Reducing sugar(%)	Chloride (%)
2022-2023	1,38	12,1	0,66
2023-2024	0,81	8,9	0,57
Control 1 (Macedonia)	1,83	7,2	1,00
Control 2 (Macedonia)	1,81	7,1	1,01

Note: Chemical composition analysis of leaves C: Leaves in the middle of the tree

Regarding nicotine content: The raw material samples of Hanski 227 variety in the trial production fields have nicotine content at a level typical of Oriental raw materials, reaching 1.38% in the 2022-2023 crop and 0.81% in the 2023-2024 crop.

Regarding reducing sugar content: The raw material samples of Hanski 227 variety have a fairly harmonious reducing sugar content, typical of this raw material type, reaching 12.1% in the 2022-2023 crop and 8.9% in the 2023-2024 crop.
Regarding chlorine content: In the fields, the raw material samples of Hanski 227 variety produced in Dak Lak in the 2022-2023 and 2023-2024 crops have a fairly low chlorine content, at 0.57 - 0.66%.
The nicotine content of the Dak Lak-produced sample was lower than that of the two imported samples, the reducing sugar content was higher but not significantly higher, and the chlorine content was lower. In general, the chemical composition of the domestically produced sample was more harmonious and characteristic of Oriental raw materials than the imported samples.
- *Sensory evaluation through Oriental tobacco smoking pot:*
Regarding aroma: Hanski 227 raw material samples in 2 crop seasons (2022-2023 and 2023-2024) have a good aroma, medium to good aroma intensity, quite harmonious and uniform. Sample 2023-2024 has a better characteristic aroma than sample 2022-2023. Domestically produced samples have a better characteristic aroma than imported samples (with a medium to good aroma).

Table 7: Smoking properties of Oriental Hanski 227 tobacco variety trial productionin Dak Lak in crop seasons 2022-2023 and 2023-2024

Samples	Smoking points (points)					
	Aroma	Taste	Heavy smoking	Burning	Colour fiber	Total points
2022-2023	12,2	9,4	4,5	3,1	4,1	33,3
2023-2024	12,5	9,5	4,3	3,2	4,3	33,8
Control 1 (Macedonia)	11,5	9,2	4,5	2,5	3,5	31,2
Control 2 (Macedonia)	11,4	9,0	4,5	2,5	3,5	30,9

Total suction score: 2 raw material samples have a good total suction score (>33.3 points), in which the 2023-2024 crop sample has a better score than the 2022-2023 sample (33.8 points). And both domestically produced samples have a higher total suction score than the 2 imported samples.
General assessment: 02 raw material samples of Hanski 227 variety in 2 crop seasons are assessed to have a good aroma, typical of Oriental raw material, good aroma intensity, good taste, rich, good weight and good suction properties. And are assessed to have a characteristic aroma and better suction properties than the 2 imported samples.

The synthesis of trial production results for Oriental Hanski 227 tobacco variety in Dak Lak in the 2022-2023 and 2023-2024 crop seasons shows that:

- Hanski 227 variety in trial production conditions has good growth, has a fairly heavy infection rate in the 2022-2023 crop season and a mild level in the 2023-2024 crop season for black stem and bacterial wilt diseases.
- Hanski 227 variety has a fairly average yield (15.27 quintals/ha and 16.65 quintals/ha). The 2023-2024 crop season has a higher yield than the 2022-2023 crop season, at over 9%.
- In terms of quality: The raw material of Hanski 227 variety has a high level of 1+2 leaves of over 78 and 83%; The chemical composition of the main substances such as nicotine and reducing sugars is quite harmonious and relatively typical of the Oriental raw material variety. The characteristic aroma is quite good, the suction properties of the raw material are assessed at a fair level and have a better aroma and suction properties than the imported raw material sample.

Thus, through the trial production of Oriental Hanski 227 tobacco variety in Dak Lak in the 2022-2023 and 2023-2024 crop seasons, it shows that this variety shows good growth ability, high yield; the raw material has a high ratio of grade 1+2 leaves and the characteristic aroma of Oriental tobacco. At the same time, it is possible to assess the suitability of Dak Lak for Oriental tobacco plants, where the weather and soil conditions are suitable for the growth and development of this type of tobacco. The raw materials have a harmonious chemical composition of the main substances, a characteristic aroma and good smoking properties and the ability to expand production, gradually meeting the demand for Oriental tobacco raw materials of domestic cigarette manufacturing companies.

CONCLUSION

After 2 years of trial cultivation of Oriental tobacco Hanski 227 in Dak Lak, the Vietnam Tobacco Institute has selected Oriental Hanski 227 tobacco, which has good growth ability, high yield and good quality; low susceptibility to insects and diseases; and is suitable for soil and weather conditions in Dak Lak, Vietnam. The quality of raw materials in Dak Lak is quite high and equivalent to imported samples, currently widely used in cigarette factories. To create good quality raw materials for production in Vietnam, the Tobacco Institute has perfected the fertilizer formula, the process of growing, harvesting, drying and preserving Oriental tobacco. In addition to its growth ability, productivity, and raw material quality, the Hanski 227 variety is also rated higher than other varieties in terms of lower raw material production costs, due to its small number of harvested leaves, large leaves, and low planting density. To expand production, the Vietnam Tobacco Institute will continue to improve processing techniques and expand the Oriental

tobacco production area in Dak Lak province in the coming time, in order to gradually meet the demand for Oriental tobacco raw materials for cigarette factories, gradually replacing imported Oriental tobacco raw materials from abroad.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Not applicable

CONSENT FOR PUBLICATION

Not applicable

REFERENCES

1. Ahmet Kinay, Güngör Yilmaz, Nejdet Kandemir. Yield and quality properties of some oriental tobacco (*Nicotiana tabacum* L.) hybrids. Genetika. 2020;52(2):735-750. DOI: 10.2298/GENSR2002735K
2. Bozukov H, Kasheva M, KochevYo. Experimental growing of Bulgarian oriental tobacco varieties in the Republic of Vietnam. Rastenievadninauki. 2021;58(1).
3. KaraivazoglouNA,PapakostaDK, Divanidis S. Effect of the degree of leaf ripeness at harvest on the yield, quality and chemical characteristics of Oriental (sun-cured) tobacco. Aristotle University of Thessaloniki, Greece; Tobacco Institute of Greece, Chemistry Dept, Drama, Greece. CORESTA Congress, Edinburgh. 2020; APPOST 01.