

REACTION OF INTRODUCED TOBACCO VARIETIES TYPE VIRGINIA TO PVY AND TMV – ECONOMICALLY IMPORTANT VIRUS DISEASES

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INTRODUCTION

Virus diseases in tobacco are a serious problem because they reduce the harvest and lower the product's quality. According to information from CORESTA /1983/ tobacco losses as a result of virus infections point to an invasion of TMV and PVY in Europe. (5, 14) One solution to the problem is the creation or introduction of resistant varieties and hybrid plants obtained by the method of classical selection.

So far the presence of the following viruses has been confirmed in Bulgaria – TMV (Tobacco mosaic virus), TSWV (Tomato spotted wilt virus), CMV (Cucumber mosaic virus), PVY (Potato virus Y), PVX (Potato virus X), AMV (Alfalfa mosaic virus) and HMV (henbane mosaic virus). Apart from that the presence in the country of TRSV (Tobacco ring-spot virus), TEV (Tobacco etch virus), TNV (Tobacco necrosis virus) and TRV (Tobacco rattle virus)

is very probable. Of the above-mentioned viruses the first four are most common, they are of greatest economic importance. /3/ The presence of ToMV (Tomato mosaic virus) is also proven – it is a typological member of the Tobamovirus group. (18)

When including introduced varieties of tobacco in Bulgaria's tobacco production one should bear in mind factors such as their adaptability to our ecological conditions and the virulence of the economically important virus diseases in Bulgaria. This is especially valid for some introduced varieties with large biological potential which cannot be utilized completely under local conditions (10).

The goal of the present research is to make an immunological assessment of introduced tobacco varieties of the Virginia type to attacks of disseminated in Bulgaria strains of PVY and TMV.

MATERIAL AND METHODS

The research was carried out during the period 2007-2008 at the Tobacco and tobacco products institute – Markovo. Nine introduced Virginia type tobacco varieties were tested: V276, B385, B278 originating in Poland, Hevesi 5 and Hevesi 4 from Hungary, PVH 19, OX 207, McNair 944 from USA and VD originating in Germany, all tested against a natural and an artificial infection background. Phytopathological assessment of their reaction to the economically important virus diseases TMV and PVY is made.

Identification of the virus contamination against a natural background of attack is made visually according to the route method.

Measurements are made on the basis of the percentage of attacked plants. The distribution of the virus contamination is calculated according to the following formula: $P = n \cdot 100 / N$, where **P** is the distribution of the disease, **N** – the total number of plants, **n** – the number of sick plants. /11/

Artificial contamination is carried out according to the method of mechanical inoculation per Noordam (1973) under controlled conditions. Measurements are made according to the scales of corresponding member Kovachevski (1983) for TMV and of Gabrovska (1982) for PVY (2, 3, 15).

The resistance assessment of the tested varieties is marked as follows:

- I - immune
- HR – highly resistant
- R – resistant
- MR – moderate resistance
- MS – medium sensitivity
- S – sensitive
- HS – highly sensitive

RESULTS AND DISCUSSION

The results obtained from the reaction of the introduced tobacco varieties tested against a natural infection background are shown in Table 1. They show that there are varieties which are not attacked by the Tobacco mosaic virus (Hevesi 4, Hevesi 5, PVH19) or the percentage of TMV attacks is below 3% with a natural attack background (McNair 944 – 2,2%, B385 – 0,9%, B278 – 1,9%). Most attacked are the varieties V 276 – 9,4% and OX 207 – 9,5%.

As far as Potato virus Y is concerned the most attacked varieties are OX 207 – 14,3% and McNair 944 – 16,9%. The varieties PVH 19, VD and B 385 are not attacked by virus, the percentage of attack of the variety Hevesi 4 is 0,7% and of V 276 – 2,5%.

For the variety PVH 19 the total percentage of attacks of the two virus diseases is 0%, for Hevesi 4 it is 0,7%, for B 385 it is 0,9% whereas for the rest of the varieties the risk of infection is more serious, OX 207 being most susceptible to attacks of the two viruses with a total percentage of 23,8%. (Table1)

The results of the immunological tests on the varieties (artificial infection) are presented in Table 2.

Under local ecological conditions and the virulence of the strains we have worked with it turned out that regarding TMV most varieties are medium sensitive. The exceptions are variety PVH 19 which reacts with resistance on the basis of supersensitivity – in the inoculated leaves in places of fast reproduction of the virus there are brown or whitish necrotic stains countering the spreading of the virus in the plant; and the variety

Hevesi 5 which reacts as a sensitive one.

The varieties OX 207 and McNair 944 are sensitive to Potato virus Y and the varieties B 278 and Hevesi 5 – as moderate resistant. The remaining five introduced varieties (V 276, Hevesi 4, PVH 19, VD and B 385) are resistant.

The results of the research show that a part of the introduced tobacco varieties tested react to PVY and TMV in a way that is different from the one reported in the literature (Table 2).

According to published data variety V 276 is highly resistant, OX 207 and McNair 944 are sensitive, B 278 is resistant, variety B 385 reacts with high to moderate resistance and PVH 19 is resistant to TMV infection (8, 10, 13, 16, 17). No data was found about the reaction of the varieties Hevesi 5, Hevesi 4 and VD to the virus in the literature used. According to the results under the conditions of the experiment it was ascertained that the varieties V 276, OX 207, McNair 944, B 278 and B 385 are medium sensitive to TMV and the resistance of PVH 19 to the virus was confirmed.

The data published in the literature shows that the variety Hevesi 5 is resistant and the varieties B 385, Hevesi 4 and V 276 are highly resistant to PVY (6, 7, 9, 10, 13, 17). However our results show that Hevesi 5 is moderate resistant and the varieties B 385, Hevesi 4 and V 276 are resistant ones. Regarding the reaction of varieties PVH 19, VD, B 278, OX 207 and McNair 944 to the virus the obtained results coincide with the ones reported in the literature. (1, 4, 10, 12, 17).

Table 1 Assessment of the natural infection background of TMV and PVY in tobacco varieties of the Virginia type

Табела 1 Оценка на природната инфекција од TMV и PVY кај различни сорти од вирџиниски тутун

variety сорта	TMV % of attack % напад од TMV	PVY % of attack % напад од PVY	Common % of attack Заеднички процент на напад
V 276	9,4	2,5	11,9
B 385	0,9	0	0,9
B 278	1,9	6,5	8,4
Hevesi 4	0	0,7	0,7
Hevesi 5	0	9,3	9,3
PVH 19	0	0	0
OX 207	9,5	14,3	23,8
McNair 944	2,2	16,9	19,1
VD	5,1	0	5,1

Table 2 Resistance of varieties tested after artificial infection with TMV and PVY

Табела 2. Отпорност на сортите испитувани по вештачка инфекција со TMV и PVY

variety сорта	TMV			PVY		
	Artificial infection background Вештачка инфекција	Published data Објавени податоци		Artificial infection background Вештачка инфекција	Published data Објавени податоци	
		Assement Оценка	Citation Извори		Assement Оценка	Citation Извори
V 276 - Poland -Полска	MS	HR	(10)	R	HR	(6,9)
B 385 - Poland -Полска	MS	HR/MR	(10)	R	HR	(6,10)
B 278 - Poland -Полска	MS	R	(8)	MR	MR	(4)
Hevesi 4 - Hungary - Унгарија	MS	-	-	R	HR	(9,10)
Hevesi 5 Hungary - Унгарија	S	-	-	MR	R	(7,8)
PVH 19 - USA - САД	R	R	(13,17)	R	R	(13,17)
OX 207 - USA - САД	MS	S	(17)	S	S	(17)
McNair 944 - USA - САД	MS	S	(13,16)	S	S	(13,17)
VD - Germany - Германија	MS	-	-	R	R	(12)

CONCLUSIONS

1. On the basis of the manifested symptoms and the degree of attack immunological assessment was made of nine introduced tobacco varieties of the Virginia type regarding TMV and PVY.

2. The resistance of the variety PVH 19 to Tobacco mosaic virus was confirmed.

3. The resistance of the varieties V 276, Hevesi 4, PVH 19, VD and B 385 to PVY was confirmed.

4. The reaction of the varieties B 385, V 276, McNair 944, Hevesi 4, Hevesi 5, B 278 and

OX 207 to PVY or TMV is different from the one reported in the literature, which is due mainly to the variability of the strain contents of both viruses and the effect of local climatic factors.

5. Regarding the reaction of the tested varieties to Potato virus Y the results against both backgrounds of attack point in the same direction.

6. The two viruses exert greatest infection pressure against a natural background of attack on variety OX 207 with a total percentage of 23,8%.

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РЕАКЦИЈА НА ИНТРОДУЦИРАНИ СОРТИ ОД ВИРѢИНИСКИ ТУТУН НА ЕКОНОМСКИ ЗНАЧАЈНИТЕ ВИРУСНИ БОЛЕСТИ PVY И TMV

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РЕЗИМЕ

Имунолошките истражувања се неразделив дел од селекцијата на тутунот. Ваквите проучувања за отпорноста на тутунските сорти се нужни имајќи ги во предвид постојаните промени на патогените во однос на вирулентноста и агресивноста.

Истражувањата беа извршени во периодот 2007-2008 во Институтот за тутун и тутунски преработки - Марково.

Врз база на манифестираните симптоми и степенот на напад од TMV и PVY, беа направени имунолошки оценувања на 9 интродуцирани сорти од вирџиниски тутун, сите тестирани врз основа на природна и вештачка инфекција.

Разликите во резултатите добиени врз основа на двете инфекции се причинети од следниве фактори, како што се разновидноста на својственоста и врз основа на присуството на инфекцијата (присуство или отсуство или резистентен ген или отсуство на вектори кај соодветната вирусна инфекција).

Резултатите од истражувањата покажаа дека дел од анализираните интродуцирани тутунски сорти реагираат на PVY и TMV на начин кој е различен од оној рефериран во литературата.

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