

## REACTION OF SOME TOBACCO SPECIES AND VARIETIES TO COMMON TOBACCO STRAIN AND TOMATO STRAIN OF TMV

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### INTRODUCTION

The losses of TMV represent over 30-35% of world's tobacco production and when young plants are infected it reaches to 40-60% /Lucas 1975/.

TMV has wide spread in Bulgaria and the losses of it can reach to 35% of yield and to 65% decrease of profit in lv/dca as result of worsen quality indexes in particular years according to Lulov /1963/.

In Macedonia (Mickovski J. 1965; 1984) TMV reduces tobacco crop between 31-62% and money expression on profit of decar between 47-81%.

The difficulties in virus control come from its many hosts which are over 300 species according to some authors. This fact is determined by its unusual mutability and ability to grow quickly in plant's tissues. A big number of strains are described in literature, differing by their cause: rate of injury, size and type of necrotic spots, rate of secondary necrosis, by color and spots position.

Mickovski, J. /1965/ in Macedonia and Marcelli /1965/ in Italy determined different strains which differ by virulence, period of incubation and serologic relation.

Smith/1975/ described six strains causing yellowish deformation, ring spot, internal browning of fruits and yellow mosaic of tomato leaves.

These strains probably appeared as a result of natural mutagenesis.

These features of TMV and losses and areas of spread direct researchers to investigate the natural resistance to it.

The Columbian tobacco variety Ambalema shows high resistance in artificial infection and it uses Clayton, Smith, Foster /1938/ for its resistance transfer to other varieties. Its use in breeding for TMV resistance is unsuccessful, because in crossing to virus sensitive varieties, obtained hybrids have dominant sensitivity explained to controlling its resistance by recessive genes. The interest of scientists is directed to the interspecies hybridization of *N.tabacum* with other species of the same family with TMV resistance type *N.glutinosa*.

Ternovskii /1959/ reported immunity shown in infection of *N.glutinosa* with TMV. The virus is localized in small spots with dead tissue and infection process development breaks off, protection cells are formed around necrotic spots which prevent penetration of virus in live tissues and plant is not affected with disease.

High importance in decreasing the losses of TMV has the creation and use of resistant varieties or with varieties decreased sensitivity.

### MATERIAL AND METHODS

In 2002 we investigated sensitivity to TMV of some tobacco varieties and types from our collection, with aim to give information necessary for preparing breeding schemes for hybridization.

Practical importance for breeding resistance to TMV have the common tobacco and to-

mato strain. According to Kovachevski I. /1983/ in investigation of 153 mosaic infected plants in different areas of the country, 136 are infected with common tobacco strain, 11 with tomato strain and 6 with both strains, i.e. 12,5% of the plants contained tomato strains.

Mosaic of tomato strains doesn't visibly differ from that of common tobacco strains.

The essential difference is that tomato strains more often localize necrosis in the place of inoculation in comparison with common tobacco strains.

In our investigation, we accomplished inoculation separately with one common tobacco strain and with tomato strain, kindly obtained by Asst.prof. Dr Dobrinka Stoikova.

We accomplished plants inoculation in the field in the stage 12-14 leaf on every plant we infected two opposite leaves, powdered them with carborundum dust /abrasive/ for leaf tissue injure and immediately after that we rubbed them by cotton tampon with infection sap.

With each variety we infected two rows / 10m<sup>2</sup>/ with one strain, and respectively so much with the other strain.

The stable varieties /types/ have characteristic localization of virus, expressed in formation of necrotic spots of dead tissue around place of inoculation where virus particles are penetrated and increased. The spread of virus stops there and therefore necrotic reaction is taken by breeders for obligatory condition in creating TMV resistant varieties by using donors having this gene inherited dominantly.

We reported infections on 5<sup>th</sup> day and on 10<sup>th</sup> day after inoculation respectively with one and with other strain.

We used the following scale for sensitivity to TMV for evaluation of mosaic stage on inoculated plants:

Sensitivity 0 - Immunity to mosaic infection.

Sensitivity 1 - Nomanifestation or slight visible indications on top leaves which don't influence the plant growth.

Sensitivity 2 – Slight late expressed mosaic mottled on top leaves without influence on leaves form and size and plants growth.

Sensitivity 3 – Visible mosaic without strong leaves deformation. Slight hold up of growth.

Sensitivity 4 – Strong mosaic characterized with strong dominishing and deformation of top leaves. Strong hold up of growth. Infected plants become pigmy in some cases.

The obtained data are presented for species in Table 1 and for varieties in Table 2.

Comparative stronger or slighter manifestation of respective symptoms were marcedwith / +/ or -/ for respective sensitivity rates.

The necrotic reaction of virus in inoculation expressed as its localization and as warranty for stability were noted with L,N /local necrosis/.

Systemically infected plants after inoculation characterize variety sensitivity and we noted them as – systematic chlorotic infection SH /systematic chlorosis/.

The plants which reacted without external indications or with systematic infection were accepted as virus vectors.

In inoculation of tobacco plants in the field at high temperatures, in spite of local necrotic reaction, systematic necrosis on the stalk or mosaic on the leaves was observed, marced as LS. The infection in natural conditions which can be find on sucker leaves /late stage of plant growth/ and at lower day temperatures, which goes as systemic, did not present a practical interest.

## RESULTS AND DISCUSSION

*N.glauca*, *N.glutinosa*, *N.goodspeedii* and *N.langsdorffii* of the investigated species *Nicotiana* show immunity to two virus strains as they react with local necrotic reaction which correspond to literature data for these species.

Lack of correspondence exists for species *N.longifolia*, *N.plumbaginifolia*, *N.sylvestris*, *N.rustica* for which Ternovskii /1974/ and Moldovan /1979/ report that they are stable. They react with systematic infection in relation to common tobacco strain in our investigations.

It is due to the fact that the difference between common tobacco and tomato strains of TMV infected tobacco doesn't take into account.

The species *N.rustica* /Mahorka/ considers as stable to TMV in literature and it react with

systematic infection to common tobacco strain. This species reacts with necrotic reaction to virus acuba-strain according to Moldovan /1974/. Acuba-strains are tomato strains and stability to them is not always identical to stability to common tobacco strains according to Kovachevski / 1983/.

The mosaic caused by tobacco strains differs significantly than that of common tobacco strains. Tomato strains spread in plant slower, because indications of infection are slighter shown. They more often induce local necrosis around the place of inoculation, therefore varieties stable to them are more in comparison to common tobacco strains.

The data represented in Table 2 show that

Table 1 Reaction of *Nicotiana* species to common tobacco strain and TMV tomato strain Experimental Tobacco Station – Rila 2002Табела 1 Реакција на видивите *Nicotiana* кон обичниот мозаик вирус на тутунот и домотот Експериментална станица Рила, 2002 год.

№	<i>Nicotiana</i> species Видови <i>Nicotiana</i>	Common tobacco strain Обичен вирус на тутунот	Tomato strain Мозаик на домотот
1.	<i>N.glauca</i>	0	0
2.	<i>N.glutinosa</i>	LN	LN
3.	<i>N.goodspeedii</i>	LN	LN
4.	<i>N.langsdorffii</i>	LN	LN
5.	<i>N.megalosiphon</i>	L+S	LN
6.	<i>N.debneyi</i>	2+	2+
7.	<i>N.longifolia</i>	3	L
8.	<i>N.plumbaginifolia</i>	4	L+S
9.	<i>N.sylvestris</i>	4	LN
10.	<i>N.rustica</i>	4	LN

7 varieties are reacted with common necrosis from investigated 50 varieties /LN/ to two virus strains. 14 investigated varieties show local necrotic reaction to tomato strain and only two varieties localized only common tobacco virus strain.

The authors opinions are in contradiction concerning TMV stability of one widespread in production variety as Krumovgrad 90. It is practically stable according to Petrov /1976/ and it is slightly sensitive according to Pophrstev and Tomov /1979/. The variety is slightly sensitive to common tobacco strain and stable to virus tomato strain according to our investigations.

The plants of Ludogoretz 311 variety are reacted with systematic local reaction /LS/ to two strains. The plants of 4 varieties are reacted with local and systematic reaction /LS/ to tomato strain and these of two varieties with same reaction to common virus tobacco strain.

Most varieties (35 of investigated 50) are reacted with strong mosaic /sensitivity 3 and 4/.

The varieties Rila 9, Sandanski 144, Djebel 81, Djebel 359, Krumovgrad 988 shown in literature sources as stable are actually sensitive to common virus tobacco strain and are stable to its tomato strain.

Table 2 Reaction of tobacco varieties to common tobacco strain and TMV tomato strain  
Experimental Tobacco Station – Rila 2002

Табела 2 Реакција на видивите Nicotiana кон обичниот мозаик вирус на тутунот и домотот,  
Експериментална станица Рила, 2002 год.

№	Variety Сорта	Common tobacco strain Обичен вирус на тутунот	Tomato strain Мозаик на домотот
1.	Basma 15	4	L
2.	Bel 61-10	4+	4
3.	Bel 61-9	4	4
4.	Bel 61-20	LN	LN
5.	Line 1 /Basma/	4	4
6.	Line 2 /Basma/	4	4
7.	Djebel 81	4	4
8.	Djebel 359	4	L
9.	Elenski 817	4	4-
10.	Imunii 580	LN	LN
11.	Dubek 566	2	3
12.	Perushitza 28	4	4
13.	Krumovgrad 90	2	LN
14.	Krumovgrad 988	4	LN
15.	Ludogoretz 311	LS	LS
16.	Nevrokop 261	LN	LN
17.	Nevrokop B-12	LN	LN
18.	Pobeda 2	3+	LN
19.	Prilep 10/2	4	L+S
20.	Prilep 7	3+	3+
21.	Rila 1	LS	LN
22.	L.Rila 202-1a	LN	L+S
23.	Rila 9	4	L
24.	Rila 207	LN	LN
25.	Rila 544	4	4
26.	Rila 20-11	4	4
27.	Rila 82	0+	L
28.	Rila 89		
29.	Rila 104	LN	1-
30.	Plovdiv 7	4	4
31.	Samsun	3	3
32.	Sandanski 144	4	LN
33.	Sandanski 321	3	3
34.	Struma 75	4	LN
35.	Tekne Chervenokovo	4	4
36.	Harmanli 163	4	4
37.	Harmanli 11	LS	LN
38.	L.Haskovo 816	4	4
39.	Tzar Krum 69	3+	3
40.	Shumen 93	3+	3
41.	Yaka /Strumitza/	3+	LN
42.	Melnik 812	4	L+S
43.	L.Rila 88	L	L
44.	Kozarsko 541	4	LN
45.	Vaksevska linia	3	L+S
46.	Haskovo 2002	3+	4-
47.	Petrich 84	4	3
48.	Madara 483	4	4
49.	Dobrudja 368	4	4-
50.	Vrania 96	4	L



Ph.1 Tobacco crop affected by the TMV  
Сл. 1. Тутунов посев нападнат од TMV

## CONCLUSION

*N. glauca*, *N. glutinosa*, *N. goodspeedii* and *N. langsdorfii* have immunity to two TMV strains from investigated 10 species *Nicotiana*, which confirmed by literature data.

Lack of correspondence to published data for TMV stability of other authors has for species: *N. debneyi*, *N. megalosiphon*, *N. longifolia*, *N. plumbaginifolia*, *N. sylvestris*, *N. rustica*. They react with systematic infection to common tobacco strain in our investigations and it is due to fact the difference between common tobacco and TMV tomato strains infected tobacco is not taken into consideration.

Reaction is analogical of the varieties shown in literature as stable:

Rila 9, Sandanski 144, Djebel 81, Djebel 359, Krumovgrad 988 and actually they are sensitive to common tobacco strain and stable only to virus tomato strain.

The obtained results give information to breeders in creation of TMV stable tobacco varieties. They can use our investigations on varieties, the localized two virus strains – Imunii 580, Nevrokokop 261, Nevrokokop B-12, Rila 207, Rila 89 and Bel 61-20.

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## РЕАКЦИЈА НА НЕКОИ ВИДОВИ И СОРТИ ТУТУН СПРЕМА СОЕВИТЕ НА ОБИЧНИОТ МОЗАИК ВИРУС НА ТУТУНОТ И ДОМАТОТ

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### РЕЗИМЕ

Од десетте проучувани видови *Nicotiana*, отпорни на двата соја од TMV се : *N.glauca*, *N.glutinosa*, *N.goodspeedii* и *N.langsдорфii*, што е потврдено од литературни податоци.

Несогласување со сознанијата од други автори за отпорност спрема TMV се јавува кај видовите : *N.debney*, *N.megalosiphon*, *N.longifolia*, *N.plumbaginifolia* и *N.rustica*, кои што во нашите проучувања реагираа со системична инфекција спрема обичниот вирус на тутунот, Ваквата реакција се должи на фактот што не е обрнато внимание на разликата меѓу соевите на вирусот на тутунот и домотот, што го напаѓаат тутунот.

Аналогна е и реакцијата на сортите што се наведени во литературата како отпорни : Рила 9, Сандански 144, Џебел 359 и Крумовград 988, кои што се осетливи на обичниот сој на мозаик вирус на тутунот и отпорни на сојот на домотот.

Добиените резултати може да им послужат на селекционерите при создавањето на сорти отпорни на TMV, со користење на нашите проучувани сорти што ги локализираат двата соја на вирусот : Имуниј 580 , Неврокоп 261 , Неврокоп Б - 12 , Рила 207, Рила 89 и Бел 61-20.

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