

## Evaluation of collection of pepper (*Capsicum* spp.) resources for resistance to *Verticillium dahliae* Kleb.

Katya Vasileva\*, Velichka Todorova, Stojka Masheva

*Agricultural Academy, Maritsa Vegetable Crop Research Institute, Plovdiv 4003, Bulgaria*

\*Corresponding author: kkvaseleva@abv.bg

### Abstract

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In the vegetation period 2017, a study was carried out for determining the reaction of 97 peppers varieties, breeding line, local forms and local varieties to the pathogen *Verticillium dahliae* Kleb. The development of the disease is reported twice: in the phenophase mass flowering to the beginning of fruiting and in the phase of mass fruiting. The accessions in both the reporting period show a high degree of resistance i.e. absence of symptoms of the disease are Buketen 3, Buketen 50, Gorogled 6, IZK Rubin and IZK Kalin. All five varieties are for sweet pepper powder produce. The 12 accessions are with highly resistance (80-100%) as six of them are with this direction of growing and usage. To the group of the resistant are referenced 10 accessions with percentage of resistance between 60 to 79%, most of them are *Kapia* varietal type. From 97 tested varieties, local forms and local varieties, it is established that according to resistance the highly susceptible group is dominated (51%), followed by the sensitive – 16%, then the highly resistant – 12%, followed by the slightly sensitive – 11% and resistant - 10%. The data establish that the groups of highly sensitive and sensitive (from 0% to 40% resistance) are formed by accessions of all tested varietal type but included all resources from *var. Blocky* and *var. Cordatum*.

*Keywords:* verticillium wilt; pepper accessions; attack index; inoculum

### Introduction

Verticillium wilting is a disease of major economic importance in the cultivation of pepper, both in field production and in greenhouse conditions (Gayoso et al., 2007). Verticillium wilt is a serious disease of a wide range of annual and perennial field and greenhouse crops with worldwide distribution (Pegg, 1974; McCain et al., 1979).

*V. dahliae* Kleb. has a broad host range, causing vascular discoloration and wilt of many economically important crops (Pegg, 1984). Globally, it is caused by the fungus *Verticillium albo-atrum* Reinke and Berthlod, and *Verticillium dahliae* Kleb., the latter is reported more frequently (Goldberg, 2003). In Bulgaria the disease is ubiquitous and the average attack index is 46% (Neshev, 1997). The main cause is *V. dahliae* Kleb. It develops in the conducting vessels of

the host and causes tracheomycosis. There is a monocyclic development.

*V. dahliae* can infect pepper plants at any growth stage. Symptoms include yellowing and drooping of leaves on a few branches or on the entire plant (Nakayama, 1960). The edges of the leaves roll inward on infected plants, and foliar wilting ensues. The foliage of severely infected plants turns brown. Growth of pepper plants inoculated with aggressive strains of *V. dahliae* in the greenhouse, or of pepper plants infected early in the season under field conditions, is severely stunted, with small leaves that turn yellow green. Subsequently, the dried leaves and shrivelled fruits remain attached to plants that die. Brown discoloration of the vascular tissue is visible when the roots and lower stem of a wilted plant is cut longitudinally. Microsclerotia produced by *V. dahliae* Kleb. may survive under field conditions for up to 14 years in the absence of a host (Wilhelm, 1995).

Isolates of *V. dahliae* from pepper plants grew well at 15, 20, and 25°C. The optimum temperature for robust growth of peppers is about 25°C (Nonnecke, 1989). Growth of pepper plants is not only reduced at temperature below 25°C, but pepper plants are also rapidly colonized by *V. dahliae* Kleb. at low temperatures and therefore the severity of *Verticillium* wilt is closely associated with growth of the pathogen (Kendrick & Middleton, 1995).

The most radical method of control is creating of resistant varieties. This method is considered to be the most reliable for disease prevention and control because of its effectiveness, ease of use and lack of possible adverse effects on the environment (Bosland, 2003). In Maritsa VCRI-Plovdiv, a purposeful pepper breeding work with continuous screening of the available gene bank is being carried out to search for sources of resistance to this important pathogen and genotypes have been identified and successfully used in the selection process (Masheva et al., 2001) for development of new varieties with high level of *Verticillium dahliae* resistance (Masheva & Todorova, 2013). Selection lines and some varieties are the result of hybridization between Bulgarian or foreign resources, relatively resistant to *V. dahliae* Kleb. As a result of purposeful breeding work at MVCRI the following original

varieties Hebar, Kapiya 1300, Kapiya UV (Vertus), Maritsa, Stryama and Buketen 50 have been bred and all of them possess field resistance to *Verticillium* wilt (Todorov & Todorova, 2002).

Jiang (2015) reported that inheritance of resistance to *V. dahliae* Kleb. is not well defined due to the limitation of resistant accessions and used molecular markers which would provide promising tools to investigate *Verticillium* wilt resistance, that would improve the efficacy of the breeding program in the chili pepper. The combination of classical and molecular approaches will increase breeding results for disease resistant chili pepper hybrids (*Capsicum*) (Gurung et al., 2015).

The aim of this research is to establish the reaction of 97 different genotypes to the pathogen *Verticillium dahliae* Kleb.

## Material and Methods

The studied pepper collection included 97 accessions from Bulgaria (72), Serbia (14), Romania (9) and Macedonia (2). 45 of them are varieties, 1 - breeding line, 47 - local forms and 4 - local varieties (Table 1). 19 of studied accessions are with pungent taste of the fruits.

**Table 1. Description of studied pepper accessions**

Accession number CAPS	Name	Country of origin	Population type	Harvest	Fruit taste
1	2	3	4	5	5
1	Dekorativni bonbonki	Bulgaria	local form	before maturity	pungent
2	Chereshki	Bulgaria	local form	before maturity	pungent
3	Chereshka mnogo lyuta	Bulgaria	local form	before maturity	pungent
4	Kambichki	Bulgaria	local form	before maturity	pungent
5	Dzhulyunska shipka 1021	Bulgaria	variety	before maturity	pungent
6	Byala shipka	Bulgaria	local variety	before maturity	pungent
7	Byala shipka - limonka	Bulgaria	local form	before maturity	pungent
8	Ribki	Bulgaria	local form	before maturity	pungent
9	Kozi roga	Bulgaria	local form	before maturity	pungent
10	Chorbadzhivski	Bulgaria	local variety	before maturity	pungent
11	Vosachna shipka	Bulgaria	local form	before maturity	sweet
12	Shipka sladka	Bulgaria	variety	before maturity	sweet
13	Limonova shipka	Bulgaria	local form	before maturity	sweet
14	IZK Delikates	Bulgaria	variety	before maturity	sweet
15	Sivria	Bulgaria	local form	before maturity	sweet
16	Sivria type	Bulgaria	local form	before maturity	sweet
17	Byal piper sivria	Bulgaria	local form	before maturity	sweet
18	Byal piper	Bulgaria	local form	before maturity	sweet
19	Sivria 600	Bulgaria	variety	before maturity	sweet

Table 1. Continued

1	2	3	4	5	5
20	Zlaten medal 7	Bulgaria	variety	before maturity	sweet
21	Albena	Bulgaria	variety	before maturity	sweet
22	Hebar	Bulgaria	variety	before maturity	sweet
23	Stryama	Bulgaria	variety	before maturity	sweet
24	Milkana F1	Bulgaria	variety	before maturity	sweet
25	Yasen F1	Bulgaria	variety	before maturity	sweet
26	Romansa	Serbia	variety	before maturity	sweet
27	Ekstaza	Serbia	variety	before maturity	sweet
28	Vrazhdebski	Bulgaria	local form	before maturity	sweet
29	Kalinkov 800/7	Bulgaria	variety	before maturity	sweet
30	Byal kalinkov	Bulgaria	local variety	before maturity	sweet
31	Maritsa	Bulgaria	variety	before maturity	sweet
32	Kaloyan	Bulgaria	variety	before maturity	sweet
33	Ratund Shabla	Bulgaria	local form	at maturity	sweet
34	Kambi S-71	Bulgaria	local form	at maturity	sweet
35	Osmarsko kambe	Bulgaria	local form	at maturity	sweet
36	Kambi	Bulgaria	local form	at maturity	sweet
37	Kambi MSH-2	Bulgaria	local form	at maturity	sweet
38	Bulgarski ratund	Bulgaria	local variety	at maturity	sweet
39	Kurtovska kapia 1619	Bulgaria	variety	at maturity	sweet
40	Kapia UV	Bulgaria	variety	at maturity	sweet
41	Sofiyska kapia	Bulgaria	variety	at maturity	sweet
42	Kapia 1300	Bulgaria	variety	at maturity	sweet
43	Kurtovska kapia 1	Bulgaria	variety	at maturity	sweet
44	Delfina	Serbia	variety	at maturity	sweet
45	Belo uvo	Serbia	variety	at maturity	sweet
46	Prizrenka	Serbia	variety	at maturity	sweet
47	Slonovo uvo	Serbia	variety	at maturity	sweet
48	Palanachko chudo	Serbia	variety	at maturity	sweet
49	Popovski ednovurh	Bulgaria	local form	at maturity	sweet
50	Kapia Todora	Bulgaria	local form	at maturity	sweet
51	Oranzheva kapia	Bulgaria	local form	at maturity	sweet
52	Baldovska kapia	Bulgaria	local form	at maturity	sweet
53	Manolska kapia	Bulgaria	local form	at maturity	sweet
54	Ranna kapia	Bulgaria	local form	at maturity	sweet
55	Kapia Stryama	Bulgaria	local form	at maturity	sweet
56	Kapia 1300 oranzheva	Bulgaria	local form	at maturity	sweet
57	Kapia Byala reka	Bulgaria	local form	at maturity	sweet
58	Dalga kapia	Bulgaria	local form	at maturity	sweet
59	Kurtovska kapia	Bulgaria	local form	at maturity	sweet
60	Kapia edra	Bulgaria	local form	at maturity	sweet
61	Kapia Belozem	Bulgaria	local form	at maturity	sweet
62	Buketen 3	Bulgaria	variety	at maturity	sweet
63	Buketen 50	Bulgaria	variety	at maturity	sweet
64	Gorogled 6	Bulgaria	variety	at maturity	sweet
65	IZK Rubin	Bulgaria	variety	at maturity	sweet
66	Mandra K-95	Bulgaria	local form	at maturity	sweet

Table 1. Continued

1	2	3	4	5	5
67	IZK Kalin	Bulgaria	variety	at maturity	sweet
68	Ratundcheta	Bulgaria	local form	before maturity	pungent
69	Vezen	Macedonia	local form	before maturity	pungent
70	Kozi rog (P)	Bulgaria	local form	before maturity	pungent
71	Dzinka	Serbia	variety	before maturity	pungent
72	Pintea	Romania	variety	before maturity	pungent
73	Dracula	Romania	variety	before maturity	pungent
74	Banatica No36	Serbia	local form	before maturity	pungent
75	89E471	Bulgaria	local form	before maturity	pungent
76	7125	Bulgaria	local form	before maturity	pungent
77	Oranzhevi sladki ribki	Bulgaria	variety	before maturity	sweet
78	Zhulti sladki ribki	Bulgaria	variety	before maturity	sweet
79	Silvia	Serbia	variety	before maturity	sweet
80	Artim	Romania	variety	before maturity	sweet
81	Amfora	Serbia	variety	at maturity	sweet
82	Kapia Parvenets	Bulgaria	local form	at maturity	sweet
83	Zvinishka kapia	Bulgaria	local form	at maturity	sweet
84	Zubovska kapia	Macedonia	local form	at maturity	sweet
85	Rosenska kapia	Bulgaria	local form	at maturity	sweet
86	Ajvarka	Serbia	variety	at maturity	sweet
87	Ivaylovska kapia	Bulgaria	variety	at maturity	sweet
88	OSPZ 4to	Bulgaria	breeding line	at maturity	sweet
89	Alexandru	Romania	variety	at maturity	sweet
90	Oranzheva kapia (P)	Bulgaria	local form	at maturity	sweet
91	Banatica No35	Serbia	local form	at maturity	sweet
92	Export	Romania	variety	before maturity	sweet
93	Andreyka	Romania	variety	before maturity	sweet
94	Barbara	Romania	variety	before maturity	sweet
95	Belinda	Romania	variety	before maturity	sweet
97	Zelen Ratund	Serbia	variety	at maturity	sweet
98	Bukur	Romania	variety	at maturity	sweet

For testing the studied collection, a mixed inoculum of six local isolates of *Verticillium dahliae* Kleb. was used. It was prepared from a one-month pure culture of the isolates grown on a standard broth of Chapek. The infection was carried out by root-dip technique, prior to planting. The roots of the plants were suspended in spores and mycelium suspension of pure cultures from the 6 isolates of the pathogen and then planted in contaminated soil (the *Verticillium* field). For each of the 97 tested genotypes, 20 plants were inoculated and grown in the field in a randomized block diagram. Periodical observations were carried out for the manifestation of disease symptoms.

The development of the disease is monitored twice: in the phenophase of mass flowering to the beginning of fruiting and in the phase of mass fruiting. The degree of attack by the pathogen is reported on a five-grade scale (0-4):

0 – healthy plants;

1 – 25% of the whole plant is affected – slightly wilting;

2 – 26-50% of the whole plant is affected – average wilting;

3 – 51-75% of the whole plant is affected – strong wilting;

4 – over 75% of the whole plant is affected.

The index of an attack (%) is calculated based on McKinney, and the percentage of resistance is based on infested plants (%):

0 – 19% – highly susceptible;

20 – 39% – susceptible;

40 – 59% – slightly susceptible;

60 – 79% – resistant;

80 – 100% – highly resistant.

The isolates, which were used for the studies, are part of the phytopathological collection of Vegetable Crop Research Institute “Maritsa” – Plovdiv.

Using the methods of correlation analysis, coefficient of variation (Cv,%) and multiple range test (Duncan, 1955), the results are statistically processed. Software products used for the investigation are “MS Excel Analysis Tool Pak Add-Ins” (<https://support.office.com>) and “R-3.1.3” in combination with “RStudio-1.1.447” and installed package “agricolae 1.2-2” (Mendiburu, 2015).

## Results and Discussion

The data presented in Table 2 reveal that there are significant differences in the index of attack between the assessed varieties and genotypes (a total of 97) in both observations. At the first observation, carried out in the phenophase mass flowering until the beginning of fruiting, the index of attack

is lower. At the second observation, in the phase of mass fruiting, there is an increase in the degree of infection, during this period the conditions favour development of the pathogen.

Of interest are varieties that in both of the reporting periods express a high degree of resistance i.e. absence of symptoms of the disease: Buketen 3, Buketen 50, Gorogled 6, IZK Rubin and IZK Kalin. All five varieties are intended for sweet pepper powder production (Table 1). Referred to the same group of resistance (80-100%) are also 7 accessions, as five of them (CAPS-10 Chorbazhiyski, CAPS-70 Kozi rog (P), CAPS-1 Dekorativni bonbonki, CAPS-68 Ratundcheta and CAPS-73 Dracula) are with pungent fruit taste (except CAPS-21 Albena *var. Conicum* and CAPS-66 Mandra K-95) (Table 1). Generally six accessions originated from Bulgaria

**Table 2. Reaction of pepper accessions to *Verticillium* wilting (*Verticillium dahliae* Kleb)**

CAPS	Variety / accession	Index of attack %					
		07-August		15-September		Resistance %	
1	2	3	4	5	6	7	8
62	Buketen 3	0.00	c	0.00	c	100.00	a
63	Buketen 50	0.00	c	0.00	c	100.00	a
64	Gorogled 6	0.00	c	0.00	c	100.00	a
65	IZK Rubin	0.00	c	0.00	c	100.00	a
67	IZK Kalin	0.00	c	0.00	c	100.00	a
10	Chorbazhiyski	2.60	c	7.48	c	90.00	a
66	Mandra K-95	2.50	c	2.58	c	90.00	a
70	Kozi rog (P)	0.00	c	4.59	c	90.00	a
1	Dekorativni bonbonki	3.21	c	13.18	c	80.00	a
21	Albena	0.00	c	10.00	c	80.00	a
68	Ratundcheta	3.20	c	11.20	c	80.00	a
73	Dracula	2.36	c	12.40	c	80.00	a
69	Vezen	29.30	bc	38.10	bc	70.00	ab
75	89E471	8.36	c	14.65	c	70.00	ab
78	Zhulti sladki ribki	13.20	c	17.90	c	70.00	ab
2	Chereshki	5.69	c	13.65	c	70.00	ab
59	Kurtovska kapia	33.30	bc	33.30	bc	68.00	ab
55	Kapia Stryama	16.80	c	25.00	bc	67.00	ab
61	Kapia Belozem	16.60	c	27.78	bc	63.00	ab
4	Kambichki	34.52	bc	44.00	ab	60.00	ab
77	Oranzhevi sladki ribki	10.30	c	37.18	bc	60.00	ab
60	Kapia edra	13.30	c	26.67	bc	60.00	ab
9	Kozi roga	32.60	bc	49.60	ab	50.00	ab
7	Byala shipka - limonka	34.80	bc	48.20	ab	50.00	ab
42	Kapia 1300	10.00	c	45.00	bc	50.00	ab
47	Slonovo uvo	20.00	c	35.00	bc	50.00	ab
74	Bananica №36	36.50	bc	50.20	ab	50.00	ab
3	Chereshka mnogo lyuta	36.20	bc	48.36	bc	50.00	ab
36	Kambi	33.30	bc	47.40	ab	44.40	bc
20	Zlaten medal 7	20.00	c	45.00	bc	40.00	bc

Table 2. Continued

1	2	3	4	5	6	7	8
71	Dzinka	55.90	ab	62.40	ab	40.00	bc
72	Pintea	33.50	bc	58.90	ab	40.00	bc
83	Zvinishka kapia	30.00	bc	45.00	bc	40.00	bc
6	Byala shipka	60.30	ab	73.10	a	30.00	bc
14	IZK Delikates	33.33	bc	61.00	ab	30.00	bc
24	Milkana F1	12.50	c	36.67	bc	30.00	bc
41	Sofiyska kapia	20.00	c	43.30	bc	30.00	bc
86	Ajvarka	20.00	c	44.20	bc	30.00	bc
97	Zelen Ratund	40.00	bc	43.30	bc	30.00	bc
89	Alexandru	29.50	bc	40.00	bc	30.00	bc
56	Kapia 1300 oranzheva	22.20	c	45.20	bc	22.20	c
5	Dzhulyunska shipka 1021	67.20	a	80.00	a	20.00	c
18	Byal piper	30.00	bc	50.00	ab	20.00	c
32	Kaloyan	34.60	bc	55.00	ab	20.00	c
43	Kurtovska kapia 1	16.67	c	30.00	bc	20.00	c
48	Palanachko chudo	53.30	ab	53.30	ab	20.00	c
87	Ivaylovska kapia	30.00	bc	45.70	bc	20.00	c
98	Bukur	58.30	ab	65.40	ab	20.00	c
51	Oranzheva kapia	12.70	c	38.40	bc	12.50	c
57	Kapia Byala reka	5.56	c	30.56	bc	11.20	c
88	OSPZ 4to	40.74	bc	59.26	ab	11.20	c
25	Yasen F1	44.40	bc	51.85	bc	11.10	c
82	Kapia Parvenets	34.20	bc	58.30	ab	11.00	c
8	Ribki	89.30	a	92.30	a	10.00	c
31	Maritsa	37.50	bc	53.30	ab	10.00	c
23	Stryama	25.00	bc	53.30	ab	10.00	c
54	Ranna kapia	20.10	c	40.00	bc	10.00	c
85	Rosenska kapia	5.00	c	30.00	bc	10.00	c
27	Ekstaza	6.67	c	30.00	bc	10.00	c
45	Belo uvo	9.09	c	39.39	bc	9.09	c
11	Vosychna shipka	47.50	ab	69.70	a	0.00	c
13	Limonova shipka	43.30	bc	55.00	ab	0.00	c
12	Shipka sladka	40.00	bc	58.70	ab	0.00	c
15	Sivria	60.61	ab	63.64	ab	0.00	c
16	Sivria type	59.26	ab	68.17	ab	0.00	c
17	Byal piper sivria	69.17	a	69.19	ab	0.00	c
19	Sivria 600	60.00	ab	69.00	ab	0.00	c
22	Hebar	35.00	bc	50.00	ab	0.00	c
26	Romansa	63.33	ab	72.50	a	0.00	c
28	Vrazhdebski	34.07	bc	66.70	ab	0.00	c
29	Kalinkov 800/7	48.90	ab	85.00	a	0.00	c
30	Byal kalinkov	50.00	ab	92.50	a	0.00	c
33	Ratund Shabla	60.00	ab	65.70	ab	0.00	c
34	Kambi S-71	49.70	ab	70.00	a	0.00	c
35	Osmarsko kambe	37.70	bc	90.63	a	0.00	c
37	Kambi MSH-2	50.00	ab	75.00	a	0.00	c
38	Bulgarski ratund	68.70	a	77.40	a	0.00	c

Table 2. Continued

1	2	3	4	5	6	7	8
39	Kurtovska kapia 1619	37.50	bc	58.30	ab	0.00	c
40	Kapia UV	26.67	bc	57.00	ab	0.00	c
44	Delfina	38.40	bc	53.13	ab	0.00	c
46	Prizrenka	33.30	bc	67.00	ab	0.00	c
49	Popovski ednovurh	49.80	ab	68.50	ab	0.00	c
50	Kapia Todora	40.00	bc	52.50	ab	0.00	c
52	Baldovska kapia	22.73	bc	48.40	ab	0.00	c
53	Manolska kapia	30.00	bc	55.00	ab	0.00	c
58	Dulga kapia	48.15	ab	52.78	ab	0.00	c
76	7125	54.14	ab	67.80	ab	0.00	c
79	Silvia	22.22	c	59.26	ab	0.00	c
80	Artim	50.30	ab	65.63	ab	0.00	c
81	Amfora	40.00	bc	57.30	ab	0.00	c
84	Zubovska kapia	25.00	bc	47.50	ab	0.00	c
90	Oranzheva kapia (P)	34.09	bc	60.61	ab	0.00	c
91	Bananica №35	29.63	bc	59.26	ab	0.00	c
92	Export	59.26	ab	81.48	a	0.00	c
93	Andreyka	45.00	ab	60.00	ab	0.00	c
94	Barbara	60.30	ab	82.50	a	0.00	c
95	Belinda	70.37	a	80.56	a	0.00	c

and directed to sweet pepper powder produce are with high level of resistance. The results for Buketen 50 confirm previous report for its *Verticillium* resistance (Todorov & Todorova, 2002). To the group of the resistant are referenced 10 accessions with percentage of resistance from 60% to 79%. Most of them are local forms and *Kapia* type: CAPS-55, CAPS-59, CAPS-60 and CAPS-61. There are 16 different accessions, which show a high percentage of resistance and index of attack lowest than 15%. The remaining 75 pepper genotypes are assigned to the *Verticillium dahliae* Kleb - sensitive groups: slightly susceptible - 11; susceptible - 15; highly susceptible - 49 accessions. Among all tested pepper varietal types *var. Blocky* and *var. Cordatum* are assigned to the susceptible groups with other accessions. It is in contrary with the established lower index of *ser. var. Grossum* reported by Masheva and Todorova (2013).

From all tested varieties, breeding line, local forms and local varieties tested, it is found that in groups of plants the percentage of resistance is segregated as follows: highly susceptible are 51%, susceptible – 16%, highly resistant – 12%, slightly susceptible – 11% and resistant are 10% of all (Fig. 1).

Fig. 2 shows the percentage of resistance in accessions grouped by varietal type. The data reveal that in the groups of highly susceptible and susceptible (from 0% to 40%), there are samples of most of the tested varietal types, and

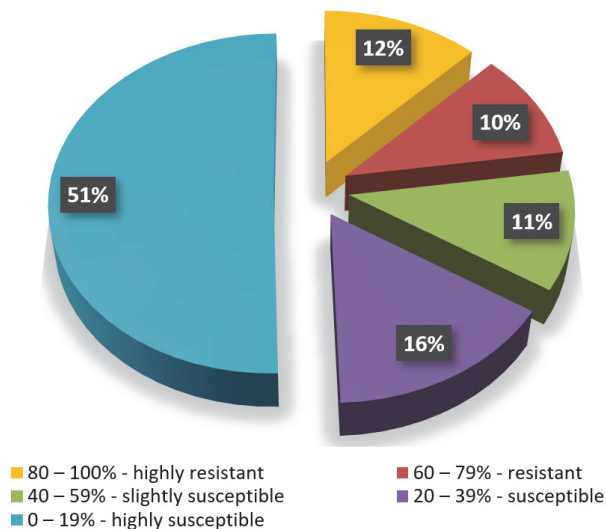


Fig. 1. Grouping of tested accessions by percentage of resistance

the majority are those of the *var. Kapia* and *var. Conicum*. The group of highly resistant (80% to 100% resistance) is dominated by pepper powder, followed by *var. Corniforme*.

The study shows that the accessions that are native selection are more resistant than foreign ones. From the group of pep-

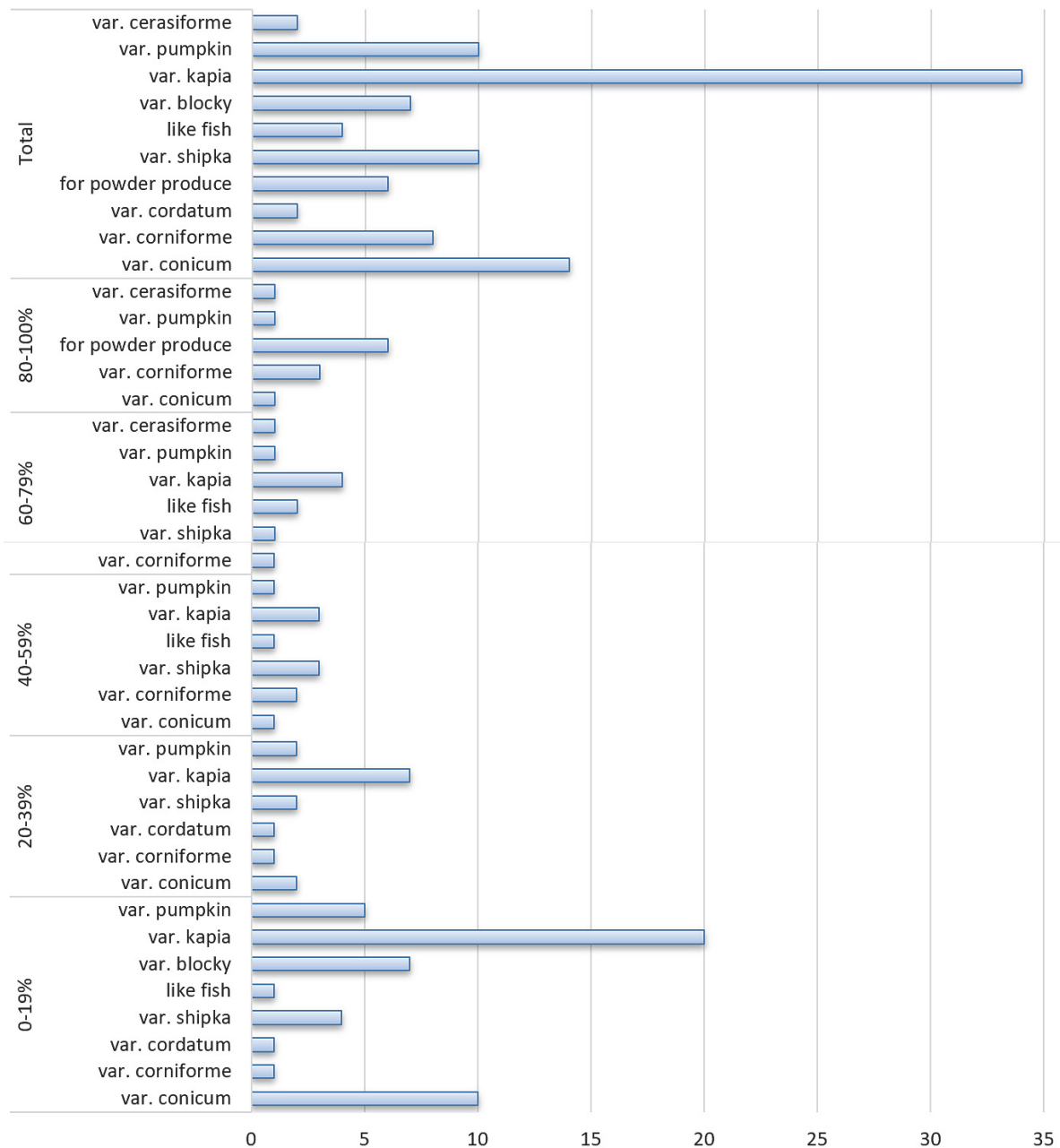


Fig. 2. Percentage of resistance to various varietal types

per varieties that have high resistance, the selection of Maritsa VCRI are Buketen 3, Buketen 50, Gorogled 6, IZK Rubin, IZK Kalin. In general, peppers for sweet powder produce have a higher resistance. These genotypes, that showed over 80% resistance, can be used in the development of future selection programs as sources of resistance to *Verticillium dahliae* Kleb.

Greater resistance to *Verticillium* wilt in cultivars of bell pepper relative to cultivars of chili pepper (Bhat & Subbarao, 1990), lower inoculum levels in fields cropped to jalapeno and bell pepper than in fields with other types of pepper, and a positive correlation between inoculum density and incidence of *Verticillium* wilt may account for



relatively low incidences of *Verticillium* wilt in bell pepper crops.

The screening of available genotypes and searching for a new sources of high resistance to *Verticillium* wilt is a priority.

## Conclusions

The pathogen *Verticillium dahliae* Kleb. is considered to be the most important one in pepper crop in Bulgaria. For this reason, the difficulties involved in controlling the disease require the search for sources of resistance.

Of the 97 tested pepper accessions, with the lowest index of attack are six originated from Bulgaria and belonging to sweet pepper powder produce – CAPS-62 Buketen 3, CAPS-63 Buketen 50, CAPS-64 Gorogled 6, IZK Rubin and CAPS-67 IZK Kalin. In the group of highly resistant prevail accessions for sweet pepper powder produce (6 genotypes), followed by *var. corniforme* (3).

The accessions with Bulgarian origin - 6 varieties, 1 local variety and 3 local forms are characterized by higher resistance.

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