

Current Status of Vegetative Compatibility Groups in *Fusarium oxysporum*: Supplement (1999)

Talma Katan¹ and P. Di Primo²

Thirty-four *formae speciales* (ff.sp.) of *Fusarium oxysporum* which have been subjected to vegetative compatibility group (VCG) analysis are listed, along with their updated 3-digit numerical codes. Ten of these ff.sp. are listed for the first time, bringing to 49 the total number of VCG-analyzed, listed ff.sp. New and corrected entries are tabulated for the remaining 24 ff.sp.

KEY WORDS: *Fusarium oxysporum*; systematic numbering; VCG coordination; vegetative compatibility.

INTRODUCTION

In a recently published summary of the current status of vegetative compatibility groups (VCGs) in *Fusarium oxysporum*, 38 *formae speciales* (ff.sp.) were listed, along with their 3-digit numerical codes and assigned VCG numbers, followed by a list of 158 references (16). Some omissions have been found in that summary that render it incomplete, and the present Supplement is intended to fill the lacunae.

Listing and numbering newly characterized *formae speciales*

Five *formae speciales* are listed along with their original numerical codes (Table 1): *garlic*, *lini*, *opuntiarum*, *vanillae* and *zingiberi*. Numerical codes are given to four as yet unnumbered *formae speciales*: *allii*, *cepa*, *fragariae* and *lagenariae*; and to the erroneously numbered f.sp. *adzukicola* (Table 1).

Re-numbering *formae speciales* and VCGs

- *adzukicola*. Due to overlap with f.sp. *dianthi*, the original code 002- of f.sp. *adzukicola* (20) is replaced by 038-.
- *asparagi*. Due to overlap with f.sp. *garlic* (code 101-), the VCG numbers 1011-1019 originally given to nine new VCGs of f.sp. *asparagi* (27) are replaced by VCG numbers 10011-10019, respectively.
- *basilici*. Due to overlap with another f.sp., the original code (016-) of f.sp. *basilici* was replaced by 020- (7,16). However, since code 020- belongs to f.sp. *vanillae* (Table 1), f.sp. *basilici* again must be re-numbered: its new f.sp. code is 040-, and the serial number assigned to its single VCG is 0400 (Table 1).

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¹Dept. of Plant Pathology, ARO, The Volcani Center, Bet Dagan 50250, Israel [Fax: +972-3-9683543; e-mail: vpptlg@agri.gov.il].

²Diptt. di Agrochimica e Agrobiologia, Università degli Studi di Reggio Calabria, 89061 Gallina (RC), Italy.

TABLE 1. Vegetative compatibility groups of *Fusarium oxysporum* listed by *forma specialis* (f.sp.)^z

<i>forma specialis</i>	Host	f.sp. code	Assigned VCG numbers	No. of VCGs	References*
<i>adzukicola</i> *	<i>Vigna angularis</i>	038- ^y	0380 ^z , 0381	2+ ^w	20
<i>allii</i> *	<i>Allium sativum</i>	039-	0390	1+	34
<i>asparagi</i>	<i>Asparagus</i>	100-	1001-1008, 10011-10019* ^v	17? ^u +	9,27,34
<i>basilici</i>	<i>Ocimum</i>	040-* ^t	0400*	1	7
<i>batatas</i>	<i>Ipomoea</i>	036-		2+	29
<i>cepa</i> *	<i>Allium cepae</i>	042-	0420	1	34
<i>conglutinans</i>	<i>Brassica</i>	010-	0100, 0101, 0104	3?	29
<i>cubense</i>	<i>Musa</i>	012-	0120-0126, 0128-01224	24+	4,5,15,21,25
<i>cucumerinum</i>	<i>Cucumis sativus</i>	018-	0180-0183	6+	29,31
<i>dianthi</i>	<i>Dianthus</i>	002-	0020-0022, 0025, 0027, 0028	6	6,22,32
<i>erythroxyli</i>	<i>Erythroxyllum</i>	029-		2	11
<i>fragariae</i> *	<i>Fragaria</i>	043-		4+	13,14
<i>garlic</i> *	<i>Allium sativum</i>	101-	1011-1013	3+	34
<i>gladioli</i>	<i>Gladiolus</i>	034-	0340-0345	6	2
<i>lagenariae</i> *	<i>Lagenaria</i>	041-		1	29
<i>lilii</i>	<i>Lilium</i>	019-	0190	1	2,34
<i>lini</i> *	<i>Linum</i>	044-	0440	1	
<i>lupini</i>	<i>Lupinus</i>	031-		2?	32
<i>lycopersici</i>	<i>Lycopersicon</i>	003-	0030-0033 ^s	4+	12,18,23,26,29,33
<i>melongenae</i>	<i>Solanum melongena</i>	032-	0320	1	29
<i>melonis</i>	<i>Cucumis melo</i>	013-	0130-0136, 0138	8+	3,35
<i>niveum</i>	<i>Citrullus</i>	008-	0080-0082	3	29
<i>opuntiarum</i> *	<i>Opuntia</i>	045-	0450-0456	7	
<i>phaseoli</i>	<i>Phaseolus</i>	016-	0161-0168	8	1
<i>pisi</i>	<i>Pisum</i>	007-	0070-0073* ^r	5?+	28,32
<i>radicis-cucumerinum</i>	<i>Cucumis sativus</i>	026-	0260, 0261 ^q	2	31
<i>radicis-lycopersici</i>	<i>Lycopersicon</i>	009-	0090-0094, 0096-0099	9+	17,26,29
<i>raphani</i>	<i>Raphanus</i>	022-	0220	1	29
<i>spinaciae</i>	<i>Spinacia</i>	033-	0330-0332* ^p	3	29
<i>tracheiphilum</i>	<i>Vigna unguiculata</i> * ^o	006-	0060	1	
<i>tulipae</i>	<i>Tulipa</i>	023-	0230	1	2,34
<i>vanillae</i> *	<i>Vanilla</i>	020-	0201, 0202	2+	30
<i>vasinfectum</i>	<i>Gossypium</i>	011-	0110-0119, 01111, 01112	12+	8
<i>zingiberi</i> *	<i>Zingiber</i>	046-			

^z Included are only *formae speciales* for which the VCG information is new or altered. New *formae speciales*, and new entries for previously described *formae speciales*, are marked with an asterisk. ^y Formerly VCG 002-(20), overlapping with f.sp. *dianthi*. ^z Subgroups were found in VCG 0380 (20). ^w + Additional isolates are not compatible with the established VCGs. ^v Formerly VCGs 1011- 1019 (27), overlapping with f.sp. *garlic*. ^u ? Two or more of these VCGs may overlap. ^t Formerly VCG 016-; then VCG 020- (7,16), overlapping with f.sp. *vanillae*. ^s Vegetative compatibility has been demonstrated between VCGs 0030/0032 (23). The proposed VCG 0034 (18,33) is suspected as corresponding to VCG 0094 of f.sp. *radicis-lycopersici*. ^r Vegetative compatibility has been demonstrated between VCGs 0070/0071 (28). ^q Vegetative compatibility has been demonstrated between VCGs 0260/0261 (31). ^p Corresponding to former VCGs 1-3, respectively (10). ^o *Vigna* sp. in ref. 16.

- *lycopersici*. Isolates from the proposed VCG 0034 (18,33) have been suspected as belonging to VCG 0094 of f.sp. *radicis-lycopersici*, thus requiring further examination. Regardless of the results, 0034 must not be assigned to other VCGs of f.sp. *lycopersici*.

Serial numbering in *formae speciales* with ten VCGs or more

In three of the ff.sp. (16; Table 1), the number of recognized VCGs is greater than 10, and additional ff.sp. are approaching this number. As the number of VCGs within a *forma specialis* increases, a point is reached when the VCG code number changes from the common 4-digit to 5-digit form. This change will involve the eleventh or tenth VCG (depending on whether the first VCG in a given f.sp. bears 0 or 1, respectively, as its serial number). Confusion in VCG numbering at this stage can be avoided by strict adherence to Puhalla's rule of systematic numbering (19,24). The code number of a given VCG is composed of two parts: The first three digits constitute the *forma specialis* code number, which is constant and does not change; the second part consists of one or two digits, which represent the serial numbers of individual VCGs, and increases consecutively as more VCGs are described. The invisible 'border' between the f.sp. code and the serial number must not be crossed, in order to avoid trespassing upon the code number of another f.sp. In case of uncertainty, f.sp. *cubense*, with its multiple VCGs, can serve as a good illustration: the f.sp. code is 012-, the first VCG is numbered 0120, the tenth is VCG 0129, the eleventh is VCG 01210, and the 22nd is VCG 01221. Thus, 012 is constant while the remainder change.

References

The publications cited in Table 1 refer to each *forma specialis* in general, not to specific entries thereof. Part of the information in Table 1 is based on unpublished data, confidentially provided by personal communication to the senior author serving as the *F. oxysporum* VCG-numbering coordinator (16,19), and hence it is not referenced.

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