

Resistances

Descriptions, recommendations and illustrations in this catalogue correspond as closely as possible to tests and practical experience. This information is provided to assist professional growers and users; however, variable local conditions must be taken into account. Under no circumstances shall Vitalis Organic Seeds, North America, accept liability based on such information for deviating results in the cultivated product. The Purchaser is responsible for determining whether the items are suitable for the intended cultivation type and location.

IMPORTANT RESISTANCE INFORMATION

Resistances in varieties of our crops are coded, unless indicated otherwise. See explanation of our coding list at www.vitalisorganic.com.

If a variety is resistant to more than one pathogen, the individual resistance codes will be separated by the symbol “/”.

- If in a resistance code of a certain variety reference is made to certain strains for which the resistance is claimed, this means that no resistance is claimed to other strains of the same pathogen.
- If in a resistance code no reference is made to specific strains of the pathogen for which the resistance is claimed, this means that resistance is claimed only generally to the pathogen, and not to specific strains of the pathogen.

Crop	Type	Scientific Name Pathogen ISF	English Name	Code	Races/ Strains	Level of Resistance	Remark
Arugula	Viruses	<i>Hyaloperonospora parasitica</i>	Downy mildew	Hp		IR	
Basil	Fungi	<i>Peronospora belbahrii</i>	Downy mildew	Pb		IR	
		<i>Fusarium oxysporum f. sp. basilicum</i>	Fusarium Wilt	Fob		IR	
Cucumber	Viruses	<i>Beet pseudo yellowing virus</i>	Beet pseudo yellowing virus	BPYV		IR	
		<i>Cucumber mosaic virus</i>	Cucumber mosaic	CMV		IR	
		<i>Cucumber vein yellowing virus</i>	Cucumber vein yellowing	CVYV		IR	
		<i>Cucurbit yellow stunting disorder virus</i>	Cucumber yellowing stunting disorder	CYSDV		IR	
		<i>Papaya ringspot virus</i>	Papaya ringspot	PRSV		IR	
		<i>Watermelon mosaic virus</i>	Watermelon mosaic	WMV		IR	
		<i>Zucchini yellow mosaic virus</i>	Zucchini yellows	ZYMV		IR	
		<i>Cucumber green mottle mosaic virus</i>	Cucumber green mottle	CGMMV		IR	
	Bacteria	<i>Pseudomonas syringae pv. lachrymans</i>	Angular leaf spot	PsI		IR	
	Fungi	<i>Cladosporium cucumerinum</i>	Scab and gummosis	Ccu		HR	
		<i>Colletotrichum orbiculare</i>	Anthracnose	Co	1	IR	
		<i>Colletotrichum orbiculare</i>	Anthracnose	Co	2	IR	
		<i>Colletotrichum orbiculare</i>	Anthracnose	Co	3	IR	
		<i>Corynespora cassicola</i>	Corynespora blight and target spot	Cca		HR	
		<i>Fusarium oxysporum f.sp. cucumerinum</i>	Fusarium wilt	Foc	1	IR	
<i>Fusarium oxysporum f.sp. cucumerinum</i>		Fusarium wilt	Foc	2	IR		
<i>Fusarium oxysporum f.sp. cucumerinum</i>		Fusarium wilt	Foc	3	IR		
<i>Podosphaera xanthii</i> (ex. <i>Sphaerotheca fuliginea</i>)		Powdery mildew	Px		IR		
<i>Pseudoperonospora cubensis</i>		Downy mildew	Pcu		IR		
Lettuce	Viruses	<i>Lettuce mosaic virus</i>	Lettuce mosaic	LMV	1	IR	LMV:1
		<i>Tomato bushy stunt virus</i>	Lettuce die-back	TBSV		HR	
	Bacteria	<i>Sphingomonas suberifaciens</i> (now <i>Rhizomonas suberifaciens</i>)	Corky root	Ss		IR	
	Fungi	<i>Bremia lactucae</i>	Downy mildew	Bl	16-37EU	HR	In USA called Bl:1-9US
		<i>Fusarium oxysporum f.sp. lactucae</i>	Fusarium wilt	Fol	1	IR/HR	
		<i>Fusarium oxysporum f.sp. lactucae</i>	Fusarium wilt	Fol	2	IR/HR	
		<i>Fusarium oxysporum f.sp. lactucae</i>	Fusarium wilt	Fol	4	IR/HR	
	Insects	<i>Macrosiphum euphorbiae</i>	Potato aphid	Me		IR	
		<i>Nasonovia ribisnigri</i>	Lettuce leaf aphid	Nr	0	HR	
		<i>Pemphigus bursarius</i>	Lettuce root aphid	Pb		HR	

HR: High Resistance | IR: Intermediate Resistance



Crop	Type	Scientific Name Pathogen ISF	English Name	Code	Races/ Strains	Level of Resistance	Remark
Melon	Viruses	<i>Cucumber mosaic virus</i>	Cucumber mosaic	CMV		IR	
		<i>Melon Necrotic Spot Virus</i>	Melon necrotic spot	MNSV		HR	
		<i>Papaya ringspot virus</i>	Papaya ringspot	PRSV		IR	
		<i>Watermelon mosaic virus</i>	Watermelon mosaic	WMV		IR	
		<i>Zucchini yellow mosaic virus</i>	Zucchini yellows	ZYMV		IR	
	Fungi	<i>Fusarium oxysporum f.sp. melonis</i>	Fusarium wilt	Fom	0	HR	
		<i>Fusarium oxysporum f.sp. melonis</i>	Fusarium wilt	Fom	1	HR	
		<i>Fusarium oxysporum f.sp. melonis</i>	Fusarium wilt	Fom	2	HR	
		<i>Fusarium oxysporum f.sp. melonis</i>	Fusarium wilt	Fom	1.2	IR	
		<i>Golovinomyces cichoracearum</i> (ex. <i>Erysiphe cichoracearum</i>)	Powdery mildew	Gc	1	IR	
		<i>Podosphaeria xanthii</i> (ex <i>Sphaerotheca fuliginea</i>)	Powdery mildew	Px	1	IR	
		<i>Podosphaeria xanthii</i> (ex <i>Sphaerotheca fuliginea</i>)	Powdery mildew	Px	2	IR	
		<i>Podosphaeria xanthii</i> (ex <i>Sphaerotheca fuliginea</i>)	Powdery mildew	Px	3	IR	
		<i>Podosphaeria xanthii</i> (ex <i>Sphaerotheca fuliginea</i>)	Powdery mildew	Px	5	IR	
		<i>Podosphaeria xanthii</i> (ex <i>Sphaerotheca fuliginea</i>)	Powdery mildew	Px	3.5	IR	
Insects	<i>Aphis gossypii</i>	Cotton aphid	Ag		IR		
Parsley	Fungi	<i>Septoria petroselini</i>	Septoria blight	Sp		IR	
		<i>Plasmopara petroselini</i>	Downy mildew	Pp		IR	
Pepper	Viruses	<i>Cucumber mosaic virus</i>	Cucumber mosaic	CMV		IR	
		<i>Pepper mottle virus</i>	Pepper mottle	PepMoV		HR	
		<i>Pepper yellow mosaic virus</i>	Pepper yellow mosaic	PepYMV		HR	
		<i>Potato Y virus</i>	Potato Y	PVY	0	HR	PVY:0
		<i>Potato Y virus</i>	Potato Y	PVY	1	HR	PVY:1
		<i>Potato Y virus</i>	Potato Y	PVY	1.2	HR	PVY:2
		<i>Tobacco etch virus</i>	Tobacco etch	TEV		IR	
	Tobamovirus group	<i>Tobamovirus (ToMV, TMV, PMMoV)</i>		Tm	0	HR	Tm:0
		<i>Tobamovirus (ToMV, TMV, TMGMV, PMMoV)</i>		Tm	0, 1	HR	Tm:0,1
		<i>Tobamovirus (ToMV, TMV, TMGMV, PMMoV)</i>		Tm	0, 1, 1.2	HR	Tm:0-2
		<i>Tobamovirus (ToMV, TMV, TMGMV, PMMoV)</i>		Tm	0, 1, 1.2, 1.2.3	HR	Tm:0-3
		<i>Tomato spotted wilt virus</i>	Tomato spotted wilt	TSWV	0	IR	
	Bacteria	<i>Xanthomonas campestris pv. vesicatoria</i>	Bacterial spot	Xcv	1	HR	
		<i>Xanthomonas campestris pv. vesicatoria</i>	Bacterial spot	Xcv	2	HR	
		<i>Xanthomonas campestris pv. vesicatoria</i>	Bacterial spot	Xcv	3	HR	
		<i>Xanthomonas campestris pv. vesicatoria</i>	Bacterial spot	Xcv	4	HR	
		<i>Xanthomonas campestris pv. vesicatoria</i>	Bacterial spot	Xcv	5	HR	
		<i>Xanthomonas campestris pv. vesicatoria</i>	Bacterial spot	Xcv	6	HR	
		<i>Xanthomonas campestris pv. vesicatoria</i>	Bacterial spot	Xcv	7	HR	
		<i>Xanthomonas campestris pv. vesicatoria</i>	Bacterial spot	Xcv	8	HR	
<i>Xanthomonas campestris pv. vesicatoria</i>		Bacterial spot	Xcv	9	HR		
<i>Xanthomonas campestris pv. vesicatoria</i>		Bacterial spot	Xcv	10	HR		
Fungi	<i>Phytophthora capsici</i>	Buckeye fruit and root rot	Pc		IR		
	<i>Leveillula taurica</i> (anamorph: <i>Oidiopsis sicula</i>)	Leveilula taurica	Lt		IR		
Nematode	<i>Meloidogyne arenaria</i>	Root-knot	Ma		IR	Resistance can be adversely affected at elevated soil temperatures (>28°C)	
	<i>Meloidogyne incognita</i>	Root-knot	Mi		IR		
	<i>Meloidogyne javanica</i>	Root-knot	Mj		IR		
Abiotic	Cracking		Cr		T		
	Stip		St		T		

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Crop	Type	Scientific Name Pathogen ISF	English Name	Code	Races/ Strains	Level of Resistance	Remark
Rootstock, Cucurbit	Fungi	<i>Fusarium oxysporum f.sp. cucumerinum</i>	Fusarium wilt	Foc	1	HR	
		<i>Fusarium oxysporum f.sp. cucumerinum</i>	Fusarium wilt	Foc	2	HR	
		<i>Fusarium oxysporum f.sp. cucumerinum</i>	Fusarium wilt	Foc	3	HR	
		<i>Fusarium oxysporum f.sp. radicis-cucumerinum</i>	Fusarium crown and root rot	Forc		IR	
		<i>Fusarium oxysporum f.sp. melonis</i>	Fusarium wilt	Fom	0	HR	
		<i>Fusarium oxysporum f.sp. melonis</i>	Fusarium wilt	Fom	1	HR	
		<i>Fusarium oxysporum f.sp. melonis</i>	Fusarium wilt	Fom	2	HR	
		<i>Fusarium oxysporum f.sp. melonis</i>	Fusarium wilt	Fom	1.2	HR	
		<i>Fusarium oxysporum f.sp. niveum</i>	Fusarium wilt	Fon	0	HR	
		<i>Fusarium oxysporum f.sp. niveum</i>	Fusarium wilt	Fon	1	HR	
		<i>Fusarium oxysporum f.sp. niveum</i>	Fusarium wilt	Fon	2	HR	
		<i>Colletotrichum orbiculare (ex Colletotrichum lagenarium)</i>	Anthracnose	Co	1	IR	
		<i>Colletotrichum orbiculare (ex Colletotrichum lagenarium)</i>	Anthracnose	Co	2	IR	
		<i>Colletotrichum orbiculare (ex Colletotrichum lagenarium)"</i>	Anthracnose	Co	3	IR	
		<i>Verticillium dahliae</i>	Verticillium wilt	Vd		IR	
		<i>Verticillium albo-atrum</i>	Verticillium wilt	Va		IR	
		<i>Phomopsis sclerotioides</i>	Black root rot	Ps		HR	
		<i>Rhizoctonia solani</i>	Rhizoctonia root & crown rot	Rs		IR	
		Nematode	<i>Meloidogyne incognita</i>	Root-knot	Mi		IR
	<i>Meloidogyne javanica</i>		Root-knot	Mj		IR	
Rootstock, Pepper	Tobamovirus group	<i>Tobamovirus (ToMV, TMV, PMMoV)</i>		Tm	0	HR	Tm:0
		<i>Tobamovirus (ToMV, TMV, TMGMV, PMMoV)</i>		Tm	0, 1	HR	Tm:0,1
		<i>Tobamovirus (ToMV, TMV, TMGMV, PMMoV)</i>		Tm	0, 1, 1.2	HR	Tm:0-2
		<i>Tobamovirus (ToMV, TMV, TMGMV, PMMoV)</i>		Tm	0, 1, 1.2, 1.2.3	HR	Tm:0-3
	Fungi	<i>Phytophthora capsici</i>	Buckeye fruit & root rot	Pc		IR	
Nematode	<i>Meloidogyne arenaria</i>	Root-knot	Ma		IR	Resistance can be adversely affected at elevated soil temperatures (>28°C)	
	<i>Meloidogyne incognita</i>	Root-knot	Mi		IR		
	<i>Meloidogyne javanica</i>	Root-knot	Mj		IR		
Rootstock, Tomato	Viruses	<i>Tomato mosaic virus</i>	Tomato mosaic	ToMV	0	HR	
		<i>Tomato mosaic virus</i>	Tomato mosaic	ToMV	1	HR	
		<i>Tomato mosaic virus</i>	Tomato mosaic	ToMV	2	HR	
		<i>Tomato spotted wilt virus</i>	Tomato spotted wilt	TSWV		IR	
	Bacteria	<i>Ralstonia solanacearum</i>	Bacterial wilt	Rs		IR	
	Fungi	<i>Fulvia fulva (ex Cladosporium fulvum)</i>	Leaf mold	Ff	A	HR	
		<i>Fulvia fulva (ex Cladosporium fulvum)</i>	Leaf mold	Ff	B	HR	
		<i>Fulvia fulva (ex Cladosporium fulvum)</i>	Leaf mold	Ff	C	HR	
		<i>Fulvia fulva (ex Cladosporium fulvum)</i>	Leaf mold	Ff	D	HR	
		<i>Fulvia fulva (ex Cladosporium fulvum)</i>	Leaf mold	Ff	E	HR	
		<i>Fusarium oxysporum f.sp. lycopersici</i>	Fusarium wilt	Fol	0	HR	In USA called Fol:1
		<i>Fusarium oxysporum f.sp. lycopersici</i>	Fusarium wilt	Fol	1	HR	In USA called Fol:2
		<i>Fusarium oxysporum f.sp. lycopersici</i>	Fusarium wilt	Fol	2	HR	In USA called Fol:3
		<i>Fusarium oxysporum f.sp. radicis-lycopersici</i>	Fusarium crown & root rot	For		HR	
		<i>Phytophthora infestans</i>	Late blight	Pi		IR	
		<i>Verticillium dahliae</i>	Verticillium wilt	Vd	0	HR	In USA called Vd:1
		<i>Verticillium albo-atrum</i>	Verticillium wilt	Va	0	HR	In USA called Va:1
		<i>Pyrenochaeta lycopersici</i>	Corky root rot	Pl		IR	
	Nematode	<i>Meloidogyne arenaria</i>	Root-knot	Ma		IR	Resistance can be adversely affected at elevated soil temperatures (>28°C)
		<i>Meloidogyne incognita</i>	Root-knot	Mi		IR	
		<i>Meloidogyne javanica</i>	Root-knot	Mj		IR	

HR: High Resistance | IR: Intermediate Resistance



Crop	Type	Scientific name pathogen ISF	English name	Code	Races/ Strains	Level of resistance	Remark
Spinach	Viruses	<i>Cucumber mosaic virus</i>	Cucumber mosaic	CMV		HR	
	Fungi	<i>Albugo occidentalis</i>	White rust	Ao		IR	
		<i>Cladosporium variabile</i>	Leaf Spot	Cv		IR	
		<i>Colletotrichum dematium</i>	Anthraxnose	Cd		IR	
		<i>Peronospora farinosa f.sp. spinaciae</i> (ex. <i>Peronospora effusa</i>)	Downy mildew	Pfs	1-19	HR	
Squash, Summer	Viruses	<i>Cucumber mosaic virus</i>	Cucumber mosaic	CMV		IR	
		<i>Papaya ringspot virus</i>	Papaya ringspot	PRSV		IR	
		<i>Watermelon mosaic virus</i>	Watermelon mosaic	WMV		IR	
		<i>Zucchini yellow mosaic virus</i>	Zucchini yellows	ZYMV		IR	
		<i>Squash leaf curl virus</i>	Squash leaf curl	SLCV		IR	
	Fungi	<i>Podosphaeria xanthii</i> (ex <i>Sphaerotheca fuliginea</i>)	Powdery mildew	Px		IR	
Squash, Winter	Viruses	<i>Cucumber mosaic virus</i>	Cucumber mosaic	CMV		IR	
		<i>Papaya ringspot virus</i>	Papaya ringspot	PRSV		IR	
		<i>Watermelon mosaic virus</i>	Watermelon mosaic	WMV		IR	
		<i>Zucchini yellow mosaic virus</i>	Zucchini yellows	ZYMV		IR	
		<i>Squash leaf curl virus</i>	Squash leaf curl	SLCV		IR	
	Fungi	<i>Podosphaeria xanthii</i> (ex <i>Sphaerotheca fuliginea</i>)	Powdery mildew	Px		IR	
		<i>Golovinomyces cichoracearum</i> (ex. <i>Erysiphe cichoracearum</i>)	Powdery mildew	Gc	1	IR	

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Crop	Type	Scientific name pathogen ISF	English name	Code	Races/ Strains	Level of resistance	Remark
Tomato	Viruses	<i>Beet mild curly top virus</i>		BMTCV		HR	
		<i>Beet Severe Curly Top Virus</i>		BSTCV		HR	
		<i>Tomato apex necrotic virus</i>	Tomato apex necrotic virus	ToANV		HR	
		<i>Tomato mosaic virus</i>	Tomato mosaic	ToMV	0	HR	
		<i>Tomato mosaic virus</i>	Tomato mosaic	ToMV	1	HR	
		<i>Tomato mosaic virus</i>	Tomato mosaic	ToMV	2	HR	
		<i>Tomato spotted wilt virus</i>	Tomato spotted wilt	TSWV		IR	
		<i>Tomato torrado virus</i>	Tomato torrado virus	ToTV		HR	
		<i>Tomato yellow leaf curl virus</i>	Tomato yellow leaf curl	TYLCV		IR	
	Bacteria	<i>Pseudomonas syringae pv. tomato</i>	Bacteria speck	Pst		HR	
		<i>Ralstonia solanacearum</i>	Bacteria wilt	Rs		IR	
		<i>Xanthomonas campestris pv. vesicatoria</i>	Bacteria spot	Xcv		HR	
	Fungi	<i>Alternaria alternata f.sp. lycopersici</i>	Alternaria stem canker	Aal		HR	
		<i>Alternaria solani</i>	Early blight	As		HR	
		<i>Fulvia fulva (ex Cladosporium fulvum)</i>	Leaf mold	Ff	A	HR	
		<i>Fulvia fulva (ex Cladosporium fulvum)</i>	Leaf mold	Ff	B	HR	
		<i>Fulvia fulva (ex Cladosporium fulvum)</i>	Leaf mold	Ff	C	HR	
		<i>Fulvia fulva (ex Cladosporium fulvum)</i>	Leaf mold	Ff	D	HR	
		<i>Fulvia fulva (ex Cladosporium fulvum)</i>	Leaf mold	Ff	E	HR	
		<i>Fusarium oxysporum f.sp. lycopersici</i>	Fusarium wilt	Fol	0	HR	In USA called Fol:1
		<i>Fusarium oxysporum f.sp. lycopersici</i>	Fusarium wilt	Fol	1	HR	In USA called Fol:2
		<i>Fusarium oxysporum f.sp. lycopersici</i>	Fusarium wilt	Fol	2	HR	In USA called Fol:3
		<i>Leveillula taurica (anamorph: Oidiopsis sicula)</i>	Powdery mildew	Lt		HR	
		<i>Oidium neolycopersici (ex Oidium lycopersicum)</i>	Powdery mildew	On		IR	
		<i>Phytophthora infestans</i>	Late blight	Pi		IR	
		<i>Pyrenochaeta lycopersici</i>	Corky root rot	Pl		IR	
		<i>Stemphylium solani</i>	Gray leaf spot	Ss		IR	
		<i>Verticillium dahliae</i>	Verticillium wilt	Vd	0	HR	In USA called Vd:1
		<i>Verticillium albo-atrum</i>	Verticillium wilt	Va	0	HR	In USA called Va:1
		Nematode	<i>Meloidogyne arenaria</i>	Root-knot	Ma		IR
	<i>Meloidogyne incognita</i>		Root-knot	Mi		IR	
	<i>Meloidogyne javanica</i>		Root-knot	Mj		IR	
Abiotic Stress	<i>Silvering</i>		Si		T		
	<i>Blossom End Rot</i>		BER		T		
	<i>Blotching</i>		Bl		T		
	<i>Cracking</i>		Cr		T		
Watermelon	Viruses	<i>Zucchini yellow mosaic virus</i>	Zucchini yellows	ZYMV		IR	
	Fungi	<i>Colletotrichum orbiculare</i>	Anthracoise	Co	1	IR	
		<i>Fusarium oxysporum f.sp. Niveum</i>	Fusarium wilt	Fon	0, 1, 2	IR	

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High Resistance (HR):

Plant varieties that highly restrict the growth and development of the specified pest or pathogen under normal pest or pathogen pressure when compared to susceptible varieties. These plant varieties may, however, exhibit some symptoms or damage under heavy pest or pathogen pressure.

Intermediate Resistance (IR):

Plant varieties that restrict the growth and development of the specified pest or pathogen, but may exhibit a greater range of symptoms or damage compared to highly resistant varieties. Intermediate resistant plant varieties will still show less severe symptoms or damage than susceptible plant varieties when grown under similar conditions.

Tolerance (T):

The ability of a plant variety to endure abiotic stress without serious consequences for growth, appearance and yield.



Quality Standards

Crop	Germination Standards Minimum (%)	Seed Count (seeds per pound)			Seed Count (seeds per kilogram)		
Arugula	85	1,134,000	to	2,268,000	2,500,000	to	4,989,500
Basil	85	266,820	to	647,990	587,000	to	1,425,580
Cauliflower	90	103,000	to	123,000	230,720	to	275,520
Chives	80	303,000	to	455,000	666,700	to	1,000,000
Cilantro	85	45,500	to	114,000	100,000	to	250,000
Cucumber	95	11,400	to	21,600	25,000	to	47,500
Dill	80	75,800	to	113,600	166,700	to	250,000
Eggplant	95	82,500	to	126,000	181,500	to	277,200
Endive	90	252,000	to	412,400	554,400	to	907,200
Fennel	90	31,950	to	36,590	70,430	to	80,670
Leek	90	114,000	to	206,200	249,500	to	453,600
Lettuce	95	239,000	to	648,000	525,200	to	1,425,600
Melon	90	11,500	to	20,000	25,760	to	44,800
Onion	90	90,000	to	125,000	198,410	to	275,580
Parsley	85	350,000	to	412,400	769,200	to	907,200
Pepper	95	44,500	to	81,000	97,800	to	178,200
Radish	85	62,400	to	68,500	137,600	to	151,000
Rootstock, Cucurbit	95	2,320	to	3,200	5,120	to	7,120
Rootstock, Pepper	95	44,500	to	81,000	97,800	to	178,200
Rootstock, Tomato	95	108,000	to	267,000	237,600	to	587,000
Sage	70	42,000	to	52,000	92,590	to	114,640
Spinach	85	29,000	to	81,000	63,200	to	178,200
Summer Squash	90	2,500	to	4,700	5,500	to	10,400
Thyme	80	42,000	to	2,200,000	2,645,520	to	4,850,120
Tomato	95	108,000	to	267,000	237,600	to	587,000
Watermelon	90	6,000	to	24,000	2,720	to	10,890
Winter Squash	90	1,400	to	2,700	3,000	to	5,900

