A CALIBRE SCIENTIFIC COMPANY

BIOREBA

Validation report

qPCR ARS/PHY/VER set

Article No.: 1819601 (qPCR ARS/PHY/VER set 96)

General information:

Target Pathogen	*Candidatus* Phytoplasma solani (PHY) *Candidatus* Arsenophonus phytopathogenicus (ARS) *Verticillium* spp. (VER)
Genus	*Phytoplasma, Arsenophonus, Verticillium*
Method	Real-Time qPCR, TaqMan (Multiplex)

Technical information:

Fluorophores	FAM: PHY | HEX: ARS | Cy5: VER | ROX: COX (IC)
Cycling program	➢ 95°C for 5 min (Hot Start) ➢ 40 Cycles: ○ 95°C for 5 sec (Denaturation) ○ 60°C for 60 sec (Annealing / Extension)
Controls	Internal positive control (IPC): Host COX gene sequence Negative control (NC): synthetic DNA Positive controls (PC): synthetic DNA

Host matrix:

Tested plant material	Leaf, tuber, root, wood
Tested species infected	*Solanum tuberosum (Potato)* *Beta vulgaris (Beet)* *Apium graveolens (Celery)* *Allium cepa (Onion)* *Rheum rhabarbarum (Rhubarb)*

Specificity:

Analytical Specificity	100%
Number of tested samples from target organisms (True Positives)	>100
Diagnostic Specificity	100%
Number of tested samples non-target organism (True Negatives)	>100
Detected isolates / geographic regions (Inclusivity)	*Ca.* P. solani 24_INO_10_K (16S rXII-A subgroup, Potato, Switzerland) *Ca.* P. solani 24_INO_135_K (16S rXII-A subgroup, Potato, Switzerland) *Ca.* P. solani 24_068_1_K (16S rXII-A subgroup, Celery, Switzerland) *Ca.* P. solani 24_ET_19_K (Potato, Switzerland) *Ca.* P. solani 24_ET_21_K (Potato, Switzerland) *Ca.* P. solani 24_ET_19_K (Potato, Switzerland) *Ca.* P. solani 25_INO_49_K (Potato, Switzerland)

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Certified Management System SQS ISO 9001
IQNET CERTIFIED MANAGEMENT SYSTEM

	Ca. A. phytopathogenicus 24_017_2_K (Potato, Switzerland) *Ca.* A. phytopathogenicus 24_018_1_K (Potato, Switzerland) *Ca.* A. phytopathogenicus 24_019_2_K (Potato, Switzerland) *Ca.* A. phytopathogenicus 24_062_1_K (Potato, Switzerland) *Ca.* A. phytopathogenicus 24_EB_2 (Potato, Switzerland) *Ca.* A. phytopathogenicus 24_ET_7 (Potato, Switzerland) *Ca.* A. phytopathogenicus 24_ET_8 (Potato, Switzerland) *Ca.* A. phytopathogenicus 24_ET_14 (Potato, Switzerland) *Ca.* A. phytopathogenicus 24_KD_4_K (Potato, Switzerland) *Verticillium* spp. 23-081A (Potato, Switzerland) *Verticillium* spp. 23-100A (Potato, Switzerland) *Verticillium* spp. 23-104A (Potato, Switzerland) *Verticillium* spp. 23-118A (Potato, Switzerland) *Verticillium* spp. 23-121A (Potato, Switzerland) *Verticillium dahliae* *Verticillium longisporum* *Verticillium tricorpus* *Verticillium nubileum* *Verticillium nonalfalfa* *Verticillium albo-atrum*
Cross reaction with (Exclusivity)	None known
No cross reaction tested with (Exclusivity)	*Clavibacter michiganensis* subsp. *sepedonicus* *Ralstonia solanacearum* *Pectobacterium parmentieri / P. wasabiae* *Pectobacterium atrosepticum* *Pectobacterium carotovorum* subsp. *brasiliense* *Dickeya solani* *Dickeya dianthicola* Potato leaf roll virus (PLRV) Tomato brown rugose fruit virus (ToBRFV)
No matrix effect observed with (Selectivity)	*Beta vulgaris* (Beet / Beetroot) – leaf, tuber and root *Humulus lupulus* (Hop) – leaf *Fragaria × ananassa* (Strawberry) – leaf *Cucumis sativus* (Cucumber) – leaf *Solanum melongena* (Eggplant) – leaf *Solanum tuberosum* (Potato) – tuber and leaf *Chenopodium quinoa* (Quinoa) – leaf *Allium porrum* (Leek) – leaf *Vitis vinifera* (Grapevine) – leaf and wood

Sensitivity:

Diagnostic Sensitivity	100%
Analytical Sensitivity / LoD	Ca. P. solani: 6800 genome equivalents Ca. A. phytopathogenicus: 1000 genome equivalents *Verticillium* spp.: 17 genome equivalents
Sensitivity on host matrix	Potato tubers (1 infected tuber in 199 healthy tubers): ○ *Ca.* P. solani: Ct ~30

	◦ *Ca.* A. phytopathogenicus: Ct ~35 ◦ *Verticillium* spp.: Ct ~34
Other sensitivity characteristics	-

Validation:

Internal validation	2024-2026
External validation	-
Reproducibility	100% (BIOREBA)
Repeatability	100% (BIOREBA)
Validation information	The internal validation was done with the internal collection of BIOREBA strains and species.

Validation release Date:
November 12th, 2026

QC manager:



Version: 1 – 12.11.2026

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