BIOREBA AG & Qualiplante SAS

BIOREBA is the Swiss company that uses science and technology to develop and manufacture high quality diagnostic testing components, used to select healthy seeds and plants that increase crop yields on millions of farms worldwide. Our complete test solutions within the field of plant pathogen diagnostics are based on the technologies ELISA, Lateral Flow (AgriStrip) and PCR since 1982. Among the existing diagnostic in vitro technologies, we believe that the molecular diagnostics is one of the fastest growing fields. In response to this fact, BIOREBA has entered into a strategic alliance with Qualiplante SAS, France, a leading manufacturer of PCR diagnostic sets within the market of plant pathogen in vitro diagnostics.

The deep expertise of Qualiplante in development, validation and production of tests based on molecular technology is uniquely complementary to BIOREBA`s philosophy in serving our customers with our established, validated and ready-to-use antibody-tests.

Thanks to this alliance we offer our customers a wide range of testing methods for more than 100 plant pathogens.
The strategic alliance allows both strategic partners to access the global market via the strong BIOREBA`s distribution network and speeds up the process of new developments in order to best serve our customer`s needs.

Qualiplante SAS and BIOREBA AG share the same company values in terms of product quality, customer satisfaction and innovation for plant pathogen diagnostics.

We are focused upon two areas of development that are aimed to address the needs of a variety of customers, from those already engaged in molecular testing and running multiple tests daily, to those who may be just starting and whose throughput is lower for certain assays.

Our PCR Sets contain Master-Mix(es) already prepared and ready-to-use, Positive and Negative Controls. There is no need to optimize reaction conditions (e.g., the concentrations of primers, $MgCl_2$ or enzymes) or cycling parameters due to unique preoptimization and validation.

For product information for diagnostic tests, based on ELISA and Lateral Flow, please refer to BIOREBA product catalog or visit our website:

bioreba.com

Workflow benefits of our PCR tests

Feature	Benefit
Ready-to-use	Time and costs saving. All our master mixes are ready-to-use in liquid form. No need to resuspend the master mixes.
Optimized assays	No need to optimize reaction conditions (e.g., the concentrations of primers, $MgCl_2$ or enzymes) or cycling parameters due to unique preoptimization and validation.
Validated assays (High sensitivity, high specificity, repeatability, reproducibility)	All our assays are validated. Criteria such as sensitivity, specificity, repeatability and reproducibility are crucial parameters for assay optimization. The User Guides provide the relevant information.
Lot-to-Lot Consistency	High level of testing reproducibility guaranteed due to defined quality release criteria.
Certificate of Analysis (CoA)	For each test-set and for each lot CoA are enclosed to delivery.
One-step-reactions	No additional manipulations by the user during the PCR reaction (exception: Addition of RT-Enzyme in End-Point RT-PCR, Taq-Man® RT-qPCR and SYBR®-Green RT-qPCR sets). Low risk of cross contamination.
Positive and negative control included	Standardized controls enable the user to control assay performance on each run. Results can be compared to the CoA. Assay reproducibility can be monitored between runs.
Multiplex (High specificity)	Some of our assays are multiplex, using different primer pairs to amplify multiple targets in one reaction with high specificity.
Reverse Transcriptase included	All our RT-PCR and RT-qPCR assays include reverse transcriptase.
Internal Control IC host gene or IC RNA included	For improved reliability of data analysis, some of our assays include internal controls (IC host gene or IC RNA). This control reaction shows that the DNA/RNA extraction worked and does not contain any inhibitory contaminants and that the PCR reaction performs as expected.
Long shelf life	In minimum 1-year from the date of delivery.

Our molecular Controls for improved reliability

Control	Description
Positive control	Positive amplification control: "Nucleic acid preparation" or "plasmid" containing the target sequence. Serves as sample for the PCR control reaction and shows how a "positive test sample" performs in the assay. Has to be tested separately (one reaction per run; like a sample).
Negative control	Negative amplification control: "Nucleic acid preparation" of healthy plant sample. Serves as sample for the PCR control reaction and shows how a "negative test sample" performs in the assay. Has to be tested separately (one reaction per run; like a sample).
Internal control (IC host gene)	Positive amplification control: Master mixes include a control reaction (primers and probes) for a plant gene (host gene). Shows that the nucleic acid extraction and the PCR reaction worked properly for each individual sample.

PCR methods used for BIOREBA PCR tests, powered by Qualiplante and by BIOREBA

Classical PCR methods

End-Point PCR

End-Point PCR is the "classical" PCR method, whereby the DNA is detected after completion of PCR amplification.
The presence or absence of the corresponding DNA product is determined by gel electrophoresis using staining of separated DNA fragments with a fluorescent dye, and digital imaging densitometry to visualize DNA bands.

Components included in the sets	Available set formats (No of reactions)
Direct Master Mix Positive Control Negative Control	24 96

End-Point RT-PCR

End-Point RT-PCR is the "classical" PCR method using RNA as starting material. In a one-step reaction first, the RNA is reverse transcribed (RT) into cDNA, then the amplified cDNA is detected after completion of PCR amplification.
The presence or absence of the corresponding DNA product is determined by gel electrophoresis using staining of separated DNA fragments with a fluorescent dye, and digital imaging densitometry to visualize DNA bands.

Components included in the sets	Available set formats (No of reactions)
Direct Master Mix Reverse Transcriptase Positive Control Negative Control	24 96

Nested End-Point PCR

Nested End-Point PCR is based on the "classical" End-Point PCR method. Nested End-Point PCR reaction involves two distinct sets of primers used in two successive PCR runs. In the second PCR, a target within the first PCR product is amplified. This method allows to reduce non-specific binding and in parallel to run more total cycles to increase the amplification.
The presence or absence of the corresponding DNA product is determined by gel electrophoresis as in a normal End-Point PCR.

Components included in the sets	Available set formats (No of reactions)
Direct Master Mix Nested Master Mix Positive Control Negative Control	24 96

Two-Step End Point RT-PCR

The Two-Step End-Point RT-PCR is based on the End-Point RT-PCR method using RNA as starting material. The difference is based on the fact that the overall reaction is split into two separate reaction steps (Two-Step). In a first step the RNA is reverse transcribed (RT) into cDNA. In a second step, the cDNA is amplified and analyzed as described above in "End-Point PCR".

Components included in the sets	Available set formats (No of reactions)
RT Master Mix Reverse Transcriptase Direct Master Mix Positive Control 1 Positive Control 2 Negative Control	24 96

Real time PCR (qPCR) methods

Taq-Man® qPCR

Taq-Man® qPCR is a PCR method, whereby the amplified DNA is measured in real-time after each amplification cycle using fluorescent Taq-Man® probes.
Taq-Man® probes are oligonucleotides, specific to the target DNA sequence, that have a fluorescent probe attached to the 5' end and a quencher to the 3' end. During PCR amplification the fluorophore will be cleaved away and is decoupled from the quencher. This leads to a strong increase of fluorescence intensity, which is proportional to the specific target DNA amplification. The fluorescence is directly measured and quantified in the real-time thermocycler. Distinct fluorophores can be used to detect multiple targets (Multiplex).

Components included in the sets	Available set formats (No of reactions)
Direct Master Mix */**	24 *
Positive Control *	96 */**
Negative Control *	192 **
Primers/Probes Mix **	
Nuclease Free Water **	

Taq-Man® RT-qPCR

Taq-Man® RT-qPCR uses RNA as starting material. In a one-step reaction, the RNA is reverse transcribed (RT) into cDNA, then the cDNA is amplified during the same reaction and the fluorescence of Taq-Man® probes is directly measured and quantified in the real-time thermocycler.

Direct Master Mix */**	24 *
Reverse Transcriptase */**	96 */**
Positive Control *	192 **
Negative Control *	
Primers/Probes/IC Mix **	
Nuclease Free Water **	

SYBR®-Green qPCR

SYBR®-Green qPCR is a PCR method, whereby the amplified DNA is measured in real-time after each amplification cycle using the fluorescent dye SYBR®-Green.
SYBR®-Green binds only to double-stranded DNA. When SYBR®-Green binds to the double-stranded DNA of the PCR products, it emits fluorescence. This leads to a strong increase in intensity of fluorescence, which is proportional to the specific target DNA amplification. Since SYBR®-Green is not able to bind to single-stranded DNA, the fluorescence signal fast and rapidly decreases during the DNA denaturation step which allows a melting curve analysis.

Direct Master Mix	24
Positive Control	96
Negative Control	

SYBR®-Green RT-qPCR

SYBR®-Green RT-qPCR uses RNA as starting material. In a one-step reaction first, the RNA is reverse transcribed (RT) into cDNA, then the cDNA is amplified during the same reaction and the fluorescence of bound SYBR®-Green dye is directly measured and quantified in the real-time thermocycler.

Direct Master Mix	24
Reverse Transcriptase	96
Positive Control	
Negative Control	

* included in the sets, powered by Qualiplante
** included in the sets, powered by Bioreba

PCR macroarray

The PCR macroarray potato virus kit is a diagnostic method for the detection of eight potato viral pathogens: PVA, PVM, PVS, PVX, PVY (O- and N-type), PLRV, PMTV and PSTVd in one single reaction. The complete kit includes macroarray strips and all reagents needed to extract RNA, to perform the RT-PCR reaction and hybridization reaction. It is optimized for pools of up to 10 dormant tuber samples. Due to multiplexing, it is cost effective and easy to use. The clearly visible color change of the hybridization positions enables convenient result evaluation by eye. To perform an assay, less than 5 hours are required.

Ordering information

The following products are developed and validated by BIOREBA:

PCR tests by BIOREBA		PCR method			Additional info					Part number					
Pathogen	**Abbr.**	PCR macroarray	Taq-Man® qPCR	Taq-Man® RT-qPCR	Positive and Negative Control	Multiplex	RT /Reverse Transcriptase)	Internal Control (IC host gene)	Internal Control (IC RNA)	96 Assays set	192 Assays set	96 Assays kit (including rapid extraction, pool size of up to 10 tuber samples)	96 Assays kit (including rapid extraction, pool size of up to 25 tuber samples)	192 Assays kit (including rapid extraction, pool size of up to 10 tuber samples)	192 Assays kit (including rapid extraction, pool size of up to 25 tuber samples)
Grapevine															
Virus															
Grapevine red blotch virus	GRBV		•		•			•		879600	879200				
Potato															
Virus & Viroid															
Potato virus A & Potato virus M	PVA/PVM			•	•		•		•	849600	849200	849610	849625	849210	849225
Potato virus Y & Potato leafroll virus	PLRV/PVY			•	•		•		•	839600	839200	839610	839625	839210	839225
Potato viruses A, M, S, X, Y (O- and N-type), potato leafroll virus, potato mop-top virus, potato spindle tuber pospiviroid	PVA, PVM, PVS, PVX, PVY, PLRV, PMTV, PSTVd	•			•	•	•	•				820032		820026	

The following products are developed and validated by Qualiplante:

Pathogen	Abbr.	Classical PCR				Real time PCR (qPCR)				Additional info				Part number	
		End Point PCR	End Point RT-PCR	Two-Step End Point RT-PCR	Nested End Point PCR	Taq-Man® qPCR	Taq-Man® RT-qPCR	SYBR®-Green qPCR	SYBR®-Green RT-qPCR	Positive and Negative Controls	Multiplex	RT (Reverse Transcriptase)	Internal Control (IC)	24 Assays	96 Assays
General															
Bacteria															
Xylella fastidiosa ssp.	Xfast				•					•				7XfastP2	7XfastP9
Xylella fastidiosa ssp.	Xfast					•				•	•		•	7Xfastq2	7Xfastq9
Phytoplasma															
Universal phytoplasma	Uniphy				•					•				7UniphP2	7UniphP9
Universal phytoplasma	Uniphy					•				•				7Uniphq2	7Uniphq9
Plant Internal Control						•				•				**7IC---q2**	**7IC---q9**
Grapevine															
Bacteria															
Agrobacterium vitis & *Agrobacterium tumefaciens*	AgVit AgTum	•								•	•			7AgVitP2	7AgVitP9
Funghi															
Botryosphaeria ssp.	Botr				•					•				7Botr-P2	7Botr-P9
Phytoplasma															
Bois noir (Phytoplasma solani) IpadLab patented primers and probes	BN					•				•	•		•	7BN---q2	7BN---q9
Flavescence dorée (Candidatus phytoplasma vitis) IpadLab patented primers and probes	FD					•				•	•		•	7FD---q2	7FD---q9
Flavescence dorée/Bois noir previous French official method	FD BN				•					•	•			7FDBN-P2	7FDBN-P9
Flavescence dorée/Bois noir IpadLab patented primers and probes	FD BN					•				•	•		•	7FDBN-q2	7FDBN-q9
Virus															
ArMV, GFLV, GFkV, GLRaV-1, GLRaV-2, GLRaV-3, GVA	7VV.woRT	•								•	•		•	77VV--P2w	77VV--P9w
ArMV, GFLV, GFkV, GLRaV-1, GLRaV-2, GLRaV-3, GVA	7VV			•						•	•	•	•	77VV--P2	77VV--P9
Grapevine fleck virus	GFkV						•			•		•		7GFkV-q2	7GFkV-q9
Grapevine fanleaf virus	GFLV						•			•		•		7GFLV-q2	7GFLV-q9
Grapevine leafroll 1	GLRaV-1						•			•		•		7GLRa1q2	7GLRa1q9
Grapevine leafroll 1	GLRaV-1								•	•				7GLRa1S2	7GLRa1S9
Grapevine leafroll 2	GLRaV-2						•			•		•		7GLRa2q2	7GLRa2q9
Grapevine leafroll 3	GLRaV-3						•			•		•		7GLRa3q2	7GLRa3q9
Grapevine leafroll 3	GLRaV-3								•	•				7GLRa3S2	7GLRa3S9
Grapevine red blotch associated virus	GRBaV	•								•				7GRBaVP2	7GRBaVP9
Grapevine red blotch associated virus	GRBaV							•		•				7GRBaVS2	7GRBaVS9
Grapevine virus A	GVA						•			•		•		7GVA--q2	7GVA--q9
Grapevine virus B	GVB						•			•		•		7GVB--q2	7GVB--q9
Grapevine pinot gris virus	GPGV		•							•		•		7GPGV-P2	7GPGV-P9
Grapevine pinot gris virus	GPGV								•	•		•		7GPGV-S2	7GPGV-S9

Pathogen	Abbr.	Classical PCR: End Point PCR	Classical PCR: End Point RT-PCR	Classical PCR: Nested End Point PCR	Real time PCR (qPCR): Taq-Man® qPCR	Real time PCR (qPCR): Taq-Man® RT-qPCR	Real time PCR (qPCR): SYBR®-Green qPCR	Real time PCR (qPCR): SYBR®-Green RT-qPCR	Additional info: Positive and Negative Controls	Additional info: Multiplex	Additional info: RT (Reverse Transcriptase)	Additional info: Internal Control (IC)	Part number: 24 Assays	Part number: 96 Assays
Fruit Trees & Small Fruits														
Bacteria														
Erwinia amylovora	Ea				•				•				7Ea---q2	7Ea---q9
Pseudomonas syringae pv. *actinidiae (Rees-George)*	PSA	•							•				7PSA--P2	7PSA--P9
Pseudomonas syringae pv. *actinidiae (Galleli)*	PSA	•							•	•			7PSA--P2g	7PSA--P9g
Pseudomonas syringae pv. *actinidiae (Rees-George)*	PSA						•		•				7PSA--S2	7PSA--S9
Pseudomonas syringae pv. *actinidiae (Galleli)*	PSA						•		•				7PSA--S2g	7PSA--S9g
Phytoplasma														
Almond witches'broom	AlmWB			•					•				7AlmWBP2	7AlmWBP9
Almond witches'broom	AlmWB						•		•				7AlmWBS2	7AlmWBS9
Apple Proliferation Group	AP			•					•				7AP---P2	7AP---P9
Viroid														
Citrus exocortis viroid	CEVd							•	•		•		7CEVd-S2	7CEVd-S9
Citrus cachexia viroid	HSVd							•	•		•		7HSVd-S2	7HSVd-S9
Virus														
Apple mosaic virus	ApMV		•						•		•		7ApMV-P2	7ApMV-P9
Apple stem pitting virus	ASPV		•						•		•		7ASPV-P2	7ASPV-P9
Cherry leaf roll virus	CLRV		•						•		•		7CLRV-P2	7CLRV-P9
Citrus tristeza virus	CTV		•						•		•		7CTV--P2	7CTV--P9
Citrus tristeza virus	CTV					•			•		•		7CTV--q2	7CTV--q9
Prunus dwarf virus	PDV		•						•		•		7PDV--P2	7PDV--P9
Prunus necrotic ringspot virus	PNRSV		•						•		•		7PNRSVP2	7PNRSVP9
Plum pox virus	PPV		•						•		•		7PPV--P2	7PPV--P9
Plum pox virus	PPV					•			•		•		7PPV--q2	7PPV--q9
Ornamentals														
Bacteria														
Xanthomonas axonopodis pv. *dieffenbachiae* Patented primers CIRAD Licence	Xad			•					•				7Xad--P2	7Xad--P9
Vegetables														
Bacteria														
Clavibacter michiganensis subsp. *michiganensis*	Cmm	•							•				7Cmm--P2	7Cmm--P9
Pseudomonas corrugata & Pseudomonas mediterranea	Pcorr	•							•	•			7PcorrP2	7PcorrP9
Ralstonia solanacearum	Rsol				•				•				7Rsol-q2	7Rsol-q9
Xanthomonas axonopodis pv. *allii* Patented primers CIRAD Licence	Xaa			•					•				7Xaa--P2	7Xaa--P9
Funghi														
Monosporascus cannonballus	Monocano	•							•				7Mncn-P2	7Mncn-P9
Viroid														
Potato spindle tuber viroid	PSTVd					•			•		•		7PSTVdq2	7PSTVdq9
Virus														
Cucumber mosaic virus	CMV	•							•				7CMV--P2	7CMV--P9
General Potyvirus	PotyV	•							•				7PotyVP2	7PotyVP9
Pepino mosaic virus	PepMV		•						•		•		7PepMVP2	7PepMVP9
Pepino mosaic virus	PepMV					•			•		•		7PepMVq2	7PepMVq9
Tomato infectious chlorosis virus	TICV					•			•		•		7TICV-q2	7TICV-q9
Tomato chlorosis virus	ToCV					•			•		•		7ToCV-q2	7ToCV-q9

BIOREBA

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