

## Information pest

Cucumber mosaic virus (CMV) was first described in 1916 on cucumber and other cucurbits but it is now known to occur worldwide in both temperate and tropical climates, affecting many agricultural and horticultural crops. CMV infects 1.200 species in over 100 plant families and can cause significant economic losses in many vegetable and horticultural crops.

CMV causes a systemic infection in most host plants but may remain symptomless in some crops like alfalfa. Symptoms of cucumber mosaic can vary greatly depending on the crop infected and the age of the plant when infection occurs.

## Introduction

The PCR CMV kit has been developed and optimized by Qualiplate based on Rizos et al. 1992. A verification was performed by Qualiplate (data not published) and the performance characteristics of the kit are the same as the original publication.

The primers were designed on the capsid protein gene. They are based on CMV-Q RNA 3 and amplify an 870 bp fragment for all CMV isolates, which can be cut by the restriction enzyme MspI to obtain patterns distinguishing S-I from S-II isolates

The test of Rizos et al., 1992 was evaluated during a ring-test of European Union COST 823.

*This product should be used only for research purposes.*

## Intended use

The End-Point PCR CMV kit is validated for the detection of Cucumber mosaic virus in End-Point PCR.

Suitable samples are plant tissues.

## Kit format and content

Article N°	Product name
PCR CMV 96	PCR Cucumber mosaic virus 96 tests
Content	96 tests
Direct Master Mix	2x48 tests
Positive Control	8 tests
Negative Control	8 tests

## Storage conditions

This kit can be shipped at room temperature but upon receipt it should be stored immediately at the recommended storage temperature: **from -30 ° C to -10 ° C.**

Avoid prolonged exposure to light and repeated freeze and thaw cycles.

## Shelf life

If the kit is correctly stored, at constant-temperature freezer, its performance is guaranteed until the expiration date indicated on the tubes label.

## Materials and equipment (not provided)

- RNA extraction tools and reagents
- Nuclease-free filter tips and micropipettes
- Optical grade nuclease-free tubes/plate
- Disposable latex or vinyl gloves
- DNA ladder and loading-dye buffer
- PCR thermal cycler
- Agarose gel reagents and apparatus
- Reverse transcriptase enzyme

## Nucleic acids extraction

Extract RNA from samples according to your usual protocol. Upon request, Qualiplate can recommend you an extraction method.

Reverse transcribe the RNA extracted from your samples into complementary DNA (cDNA) according to your usual protocol.

## Reaction set-up

- Slowly thaw **Direct Master Mix** by placing it on ice or at 4°C.
- Shake briefly **Direct Master Mix** and spin down the liquid.
- Add 23 µl of **Direct Master Mix** (without cDNA template) to each PCR tubes or wells of an optical-grade PCR plate.
- Add 2 µl of cDNA template to the **Direct Master Mix**. Do not forget to prepare a PCR tube or well of a PCR plate for the **Positive Control** and the **Negative Control**.

Components	Volume/PCR tube or well
cDNA template or <b>Positive control</b> or <b>Negative control</b>	2 µl
<b>Direct Master Mix</b>	23 µl
Total Volume / PCR tube or well	25 µl

*In order to confirm the absence of any reagent's contamination, we strongly recommend including a no-template control (e.g. DEPC water) in the assay.*

## Run and thermal cycling

- Seal carefully the PCR tubes or the PCR plate. Centrifuge briefly to collect components at the bottom of the PCR tubes or wells of the plate. Protect from light before thermocycling.
- Load the PCR tubes or plate into the PCR thermal cycler and follow the thermal cycling below:

Steps	Temp (°C)	Time	Cycle(s)
Initial denaturation	95°C	2 min	1
Denaturation	95°C	45 sec	35
Annealing	58°C	45 sec	
Elongation	72°C	1 min	
Final elongation	72°C	7 min	1
Storage	4°C	∞	-

## Agarose gel electrophoresis

Prepare an agarose gel at 1% w/v in 1X-TAE buffer.

### Gel loading:

- load the DNA ladder (for example 100-1.000 bp DNA step ladder).
- load 10 µl of PCR products from the previous step adding the loading dye buffer (*not provided in the kit*).

**Run:** run the gel electrophoresis for 40-45 minutes at 80V.

## Results analysis

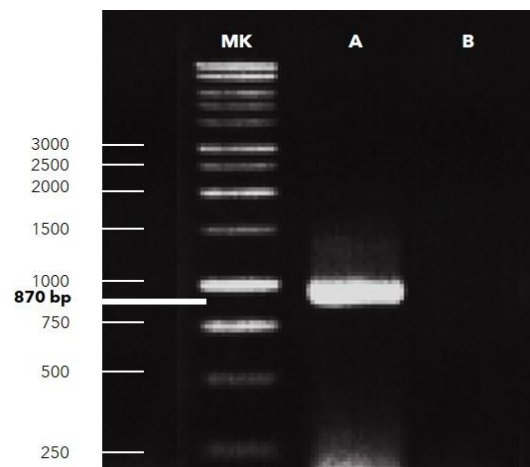
### ANALYSIS VALIDATION

Cucumber mosaic virus is detected when an 870 bp DNA fragment is observed.

The analysis is validated when:

- ✓ 1 DNA fragment of 870 bp is visible in the positive control lane. *A smaller less intensive 820 bp band can be observed for several isolates and it is more easily visible when the first band is less intensive.*
- ✓ No DNA fragment is visible in the negative

The picture below represents a 1X-TAE 1% agarose gel showing the DNA amplification in a sample infected by Cucumber mosaic virus:



**MK:** DNA ladder - **A:** Cucumber mosaic virus (870 bp) positive sample or **Positive Control** of the kit - **B:** Healthy sample or **Negative Control** of the kit

### RESULTS INTERPRETATION

The specific product of Cucumber mosaic virus is an 870 bp fragment.

- ✓ A sample is **positive** when an 870 bp DNA specific fragment is present in the PCR reaction; in this case, the sample is infected by Cucumber mosaic virus.
- ✓ A sample is negative when no fragment is present in the PCR reaction.
- ✓

The table below summarizes the results interpretation:

Fragment size	Interpretation
<b>870 bp</b>	
-	<b>NEGATIVE</b>
✓	<b>POSITIVE</b> Cucumber mosaic virus

**POSITIVE:** infected sample – **NEGATIVE:** healthy sample

### Special handling instructions

This kit was designed to be used by laboratory staff trained to follow the usual molecular biology precautions. Always perform the tests in a nuclease-free work environment. Always wear gloves when handling samples containing DNA/RNA and the components of the kit. Do not touch any kit components with an ungloved hand. Use appropriate laboratory disposable parts. Use nuclease-free tubes and filter tips to avoid degradation and cross-contamination. Do not use components from kits with different batch numbers in the same test procedure. Do not interchange reagents with other kits. To avoid cross-contamination, use separate rooms for (a) nucleic acids extraction, (b) preparation of the Master Mix and (c) amplification. To avoid cross-contamination and obtain reliable results, it is essential to strictly follow the protocol in this manual. Avoid unnecessary freeze-thaw cycles of the kit components. Do not use reagents after their expiration date.

### Troubleshooting

**Post-PCR data analysis shows no amplification, or amplification plots look grossly abnormal:**

Possible causes	Corrective actions
Evaporation of the sample due to inadequate sealing of the plate	Repeat the test using the appropriate tools to correctly seal the plate
Consumables are not appropriate for the method	Repeat the test using consumables recommended by the thermal cycler supplier
The quality of nucleic acid extracted is low	Repeat the extraction step. Ensure that the method of extraction has been performed correctly. In any doubt, please, contact us
Abnormal amplification	Centrifuge the plate briefly to spin down the contents and eliminate any air bubbles

**No amplification reaction is observed in the positive control well, while other samples are positive:**

Possible causes	Corrective actions
The positive control provided with the kit was not added into the reaction well	Repeat the test. If the problem persists, please, contact us

**An amplification plot is observed in the negative control well:**

Possible causes	Corrective actions
Contamination of the negative control or the Master Mix with target-positive nucleic acid	Repeat the test by applying appropriate quality procedures to prevent contamination. Seal the plate correctly

### Warranty and Responsibilities

Qualiplante SAS guarantees the buyer exclusively concerning the quality of reagents and of the components used to produce the Kits. Any product not fulfilling the specifications included in the product sheet will be replaced. This warranty limits Qualiplante SAS responsibility to the replacement of the product. No other warranties, of any kind, express or implied-are provided by Qualiplante SAS.

Qualiplante SAS is not responsible and cannot anyway be considered responsible or jointly responsible for possible direct and indirect damages resulting of the use and/or the misuses of the Kits. The user consciously and under her/his own responsibilities decides for the utilization purposes of the Kits and uses it the way she/he considers most suitable in order to reach her/his goals and/or objectives. Qualiplante SAS is not responsible for the data resulting from the use of the Kits, for the utilization that the user independently decides to make of them or for the direct or indirect damages possibly resulting from the disclosure or transmission of the data themselves to third parties under any form or circumstance. This clause is automatically accepted by the user when purchasing the Kits.

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The Kits have been internally tested by our quality control. Any responsibility is waived if the warranty of quality control does not refer to the specific Kits. The user is personally responsible for data that she/he will obtain and/or she/he will supply to third parties using these Kits. Once the sealed package is opened the user accepts all the conditions without fail; if the package is still sealed the kit can be returned and the user can be refunded.

Kits components are intended, developed, designed, and sold for Research Purpose Only. Product claims are subject to change.