

Primerdesign™ Ltd

# Apium graveolens Celery/Celeriac

genesig®  
Allergen detection Kit

100 tests

GENESIG

Kits by Primerdesign

For general laboratory and research use only

# Introduction to *Apium graveolens*

Celery (*Apium graveolens* var. *dulce*) and celeriac (*Apium graveolens* var. *rapaceum*) are both members of the family Apiaceae, commonly used as vegetables. They are among a small group of foods (headed by peanuts) that appear to provoke the most severe allergic reactions; for people with celery or celeriac allergies, exposure can cause potentially fatal anaphylactic shock.

The allergen does not appear to be destroyed at cooking temperatures. Celery root is known to contain more allergen than the stalk. Seeds contain the highest levels of allergen content.

An allergic reaction also may be triggered by eating foods that have been processed with machines that have previously processed celery or celeriac, making avoiding such foods difficult. In contrast with peanut allergy being most prevalent in the US, celery or celeriac allergies are most prevalent in Central Europe.

In the European Union, foods that contain or may contain celery or celeriac, even in trace amounts, must be clearly marked as such.

For this reason testing for the presence of celery or celeriac can be important, e.g. in food processing.

# Specificity

The Primerdesign genesig Kit for *Apium graveolens* (Celery/Celeriac) genomes is designed for the in vitro quantification of Celery/Celeriac genomes. The kit is designed to have the broadest detection profile possible whilst remaining specific to the Celery/Celeriac genome.

The primers and probe sequences in this kit have 100% homology with a broad range of Celery/Celeriac sequences based on a comprehensive bioinformatics analysis.

This allergen detection kit specifically detects *A. graveolens* variants including *Apium graveolens* var. *dulce* (celery) and *A. graveolens* var. *rapaceum* (celeriac) but no other nuts, seeds or allergens. For this reason it is ideally suited for testing if processed foodstuff contains traces of celery and celeriac

If you require further information, or have a specific question about the detection profile of this kit then please send an e.mail to [enquiry@primerdesign.co.uk](mailto:enquiry@primerdesign.co.uk) and our bioinformatics team will answer your question.

# Kit Contents

- **Apium graveolens specific primer/probe mix (BROWN)**  
FAM labelled
- **Apium graveolens positive control template (for Standard curve RED)**
- **Internal extraction control primer/probe mix (BROWN)**  
VIC labelled as standard
- **Internal extraction control DNA (BLUE)**
- **RNase/DNase free water (WHITE)**  
for resuspension of primer/probe mixes
- **Template preparation buffer (YELLOW)**  
for resuspension of internal control template and positive control template and standard curve preparation

## Reagents and equipment to be supplied by the user

### Real-time PCR Instrument

#### DNA extraction kit

This kit is recommended for use with genesig Easy Plant DNA/RNA Extraction kit. However, it is designed to work well with all processes that yield high quality DNA with minimal PCR inhibitors.

#### oasig™ lyophilised or Precision® PLUS 2X qPCR Master Mix

This kit is intended for use with oasig or PrecisionPLUS 2X qPCR Master Mix.

#### Pipettors and Tips

#### Vortex and centrifuge

#### Thin walled 1.5 ml PCR reaction tubes

## Kit storage and stability

This kit is stable at room temperature but should be stored at -20°C on arrival. Once the lyophilised components have been re-suspended they should not be exposed to temperatures above -20°C for longer than 30 minutes at a time and unnecessary repeated freeze/thawing should be avoided. The kit is stable for six months from the date of resuspension under these circumstances.

If a standard curve dilution series is prepared this can be stored frozen for an extended period. If you see any degradation in this serial dilution a fresh standard curve can be prepared from the positive control.

Primerdesign does not recommend using the kit after the expiry date stated on the pack.

## Suitable sample material

All kinds of sample material suited for PCR amplification can be used. Please ensure the samples are suitable in terms of purity, concentration, and DNA integrity (An internal PCR control is supplied to test for non specific PCR inhibitors). Always run at least one negative control with the samples. To prepare a negative-control, replace the template DNA sample with RNase/DNase free water.

## Dynamic range of test

Under optimal PCR conditions genesig Celery/Celeriac detection kits have very high priming efficiencies of >95% and can detect less than 100 copies of target template.

## Notices and disclaimers

This product is developed, designed and sold for research purposes only. It is not intended for human diagnostic or drug purposes or to be administered to humans unless clearly expressed for that purpose by the Food and Drug Administration in the USA or the appropriate regulatory authorities in the country of use. During the warranty period Primerdesign genesig detection kits allow precise and reproducible data recovery combined with excellent sensitivity. For data obtained by violation to the general GLP guidelines and the manufacturer's recommendations the right to claim under guarantee is expired. PCR is a proprietary technology covered by several US and foreign patents. These patents are owned by Roche Molecular Systems Inc. and have been sub-licensed by PE Corporation in certain fields. Depending on your specific application you may need a license from Roche or PE to practice PCR. Additional information on purchasing licenses to practice the PCR process may be obtained by contacting the Director of Licensing at Roche Molecular Systems, 1145 Atlantic Avenue, Alameda, CA 94501 or Applied Biosystems business group of the Applied Biosystems Corporation, 850 Lincoln Centre Drive, Foster City, CA 94404. In addition, the 5' nuclease assay and other homogeneous amplification methods used in connection with the PCR process may be covered by U.S. Patents 5,210,015 and 5,487,972, owned by Roche Molecular Systems, Inc, and by U.S. Patent 5,538,848, owned by The Perkin-Elmer Corporation.

## Trademarks

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The PCR process is covered by US Patents 4,683,195, and 4,683,202 and foreign equivalents owned by Hoffmann-La Roche AG. BI, ABI PRISM®, GeneAmp® and MicroAmp® are registered trademarks of the Applied Biosystems (Applied Biosystems Corporation). BIOMEK® is a registered trademark of Beckman Instruments, Inc.; iCycler™ is a registered trademark of Bio-Rad Laboratories, Rotor-Gene is a trademark of Corbett Research. LightCycler™ is a registered trademark of the Idaho Technology Inc. GeneAmp®, TaqMan® and AmpliTaqGold® are registered trademarks of Roche Molecular Systems, Inc., The purchase of the Primerdesign reagents cannot be construed as an authorization or implicit license to practice PCR under any patents held by Hoffmann-La Roche Inc.

# Principles of the test

## Real-time PCR

A Celery/Celeriac specific primer and probe mix is provided and this can be detected through the FAM channel.

The primer and probe mix provided exploits the so-called TaqMan® principle. During PCR amplification, forward and reverse primers hybridize to the Celery/Celeriac DNA. A fluorogenic probe is included in the same reaction mixture which consists of a DNA probe labeled with a 5'-dye and a 3'-quencher. During PCR amplification, the probe is cleaved and the reporter dye and quencher are separated. The resulting increase in fluorescence can be detected on a range of qPCR platforms.

## Positive control

For copy number determination and as a positive control for the PCR set up, the kit contains a positive control template. This can be used to generate a standard curve of Celery/Celeriac copy number / Cq value. Alternatively the positive control can be used at a single dilution where full quantitative analysis of the samples is not required. Each time the kit is used, at least one positive control reaction must be included in the run. A positive result indicates that the primers and probes for detecting the target Celery/Celeriac gene worked properly in that particular experimental scenario. If a negative result is obtained the test results are invalid and must be repeated. Care should be taken to ensure that the positive control does not contaminate any other kit component which would lead to false-positive results. This can be achieved by handling this component in a Post PCR environment. Care should also be taken to avoid cross-contamination of other samples when adding the positive control to the run. This can be avoided by sealing all other samples and negative controls before pipetting the positive control into the positive control well.

## Negative control

To validate any positive findings a negative control reaction should be included every time the kit is used. For this reaction the RNase/DNase free water should be used instead of template. A negative result indicates that the reagents have not become contaminated while setting up the run.

### **Internal DNA extraction control**

When performing DNA extraction, it is often advantageous to have an exogenous source of DNA template that is spiked into the lysis buffer. This control DNA is then co-purified with the sample DNA and can be detected as a positive control for the extraction process. Successful co-purification and qPCR for the control DNA also indicates that PCR inhibitors are not present at a high concentration.

A separate primer and probe mix are supplied with this kit to detect the exogenous DNA using qPCR. The primers are present at PCR limiting concentrations which allows multiplexing with the target sequence primers. Amplification of the control DNA does not interfere with detection of the Celery/Celeriac target DNA even when present at low copy number. The Internal control is detected through the VIC channel and gives a Cq value of 28 +/-3.

# Resuspension Protocol

To minimize the risk of contamination with foreign DNA, we recommend that all pipetting be performed in a PCR clean environment. Ideally this would be a designated PCR lab or PCR cabinet. Filter tips are recommended for all pipetting steps.

- 1. Pulse-spin each tube in a centrifuge before opening.**  
This will ensure lyophilised primer and probe mix is in the base of the tube and is not spilt upon opening the tube.
- 2. Resuspend the primer/probe mixes in the RNase/DNase free water supplied, according to the table below:**  
To ensure complete resuspension, vortex each tube thoroughly.

Component - resuspend in water	Volume
<b>Pre-PCR pack</b>	
Celery/Celeriac primer/probe mix (BROWN)	110 µl
Internal extraction control primer/probe mix (BROWN)	165 µl

- 3. Resuspend the internal control template and positive control template in the template preparation buffer supplied, according to the table below:**  
To ensure complete resuspension, vortex the tube thoroughly.

Component - resuspend in template preparation buffer	Volume
<b>Pre-PCR heat-sealed foil</b>	
Internal extraction control DNA (BLUE)	600 µl
<b>Post-PCR heat-sealed foil</b>	
Celery/Celeriac Positive Control Template (RED) *	500 µl

\* This component contains high copy number template and is a VERY significant contamination risk. It must be opened and handled in a separate laboratory environment, away from the other components.

## DNA extraction

The internal extraction control DNA can be added either to the DNA lysis/extraction buffer or to the DNA sample once it has been resuspended in lysis buffer.

**DO NOT add the internal extraction control DNA directly to the unprocessed biological sample as this will lead to degradation and a loss in signal.**

- 1. Add 4µl of the Internal extraction control DNA (BLUE) to each sample in DNA lysis/extraction buffer per sample.**
- 2. Complete DNA extraction according to the manufacturers protocols.**



# qPCR detection protocol

1. **For each DNA sample prepare a reaction mix according to the table below:**  
Include sufficient reactions for positive and negative controls.

Component	Volume
oasig or PrecisionPLUS 2X qPCR Master Mix	10 $\mu$ l
Celery/Celeriac primer/probe mix (BROWN)	1 $\mu$ l
Internal extraction control primer/probe mix (BROWN)	1 $\mu$ l
RNase/DNase free water (WHITE)	3 $\mu$ l
<b>Final Volume</b>	<b>15 <math>\mu</math>l</b>

2. **Pipette 15 $\mu$ l of each mix into individual wells according to your qPCR experimental plate set up.**
3. **Prepare sample DNA templates for each of your samples.**
4. **Pipette 5 $\mu$ l of DNA template into each well, according to your experimental plate set up.**  
For negative control wells use 5 $\mu$ l of RNase/DNase free water. The final volume in each well is 20 $\mu$ l.
5. **If a standard curve is included for quantitative analysis prepare a reaction mix according to the table below:**

Component	Volume
oasig or PrecisionPLUS 2X qPCR Master Mix	10 $\mu$ l
Celery/Celeriac primer/probe mix (BROWN)	1 $\mu$ l
RNase/DNase free water (WHITE)	4 $\mu$ l
<b>Final Volume</b>	<b>15 <math>\mu</math>l</b>

## 6. Preparation of standard curve dilution series.

- 1) Pipette 90µl of template preparation buffer into 5 tubes and label 2-6
- 2) Pipette 10µl of Positive Control Template (RED) into tube 2
- 3) Vortex thoroughly
- 4) Change pipette tip and pipette 10µl from tube 2 into tube 3
- 5) Vortex thoroughly

Repeat steps 4 and 5 to complete the dilution series

Standard Curve	Copy Number
Tube 1 Positive control (RED)	$2 \times 10^5$ per µl
Tube 2	$2 \times 10^4$ per µl
Tube 3	$2 \times 10^3$ per µl
Tube 4	$2 \times 10^2$ per µl
Tube 5	20 per µl
Tube 6	2 per µl

## 7. Pipette 5µl of standard template into each well for the standard curve according to your experimental plate set up.

The final volume in each well is 20µl.

# qPCR amplification protocol

Amplification conditions using oasis or PrecisionPLUS 2X qPCR Master Mix.

	Step	Time	Temp
	Enzyme activation	2 min	95 °C
Cycling x50	Denaturation	10 s	95 °C
	DATA COLLECTION *	60 s	60 °C

\* Fluorogenic data should be collected during this step through the FAM and VIC channels

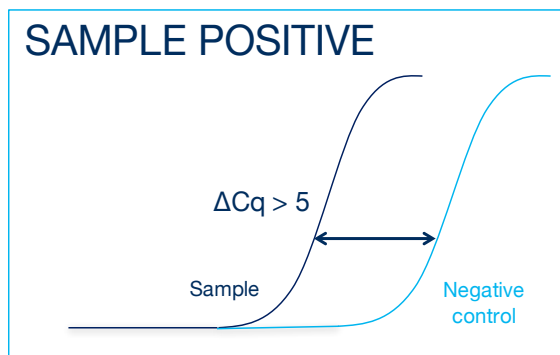
# Interpretation of results

Target (FAM)	Internal control (VIC)	Positive control	Negative control	Interpretation
≤ 30	+ / -	+	-	<b>POSITIVE QUANTITATIVE RESULT</b> calculate copy number
> 30	+	+	-	<b>POSITIVE QUANTITATIVE RESULT</b> calculate copy number
> 30	-	+	-	<b>POSITIVE QUALITATIVE RESULT</b> do not report copy number as this may be due to poor sample extraction
-	+	+	-	<b>NEGATIVE RESULT</b>

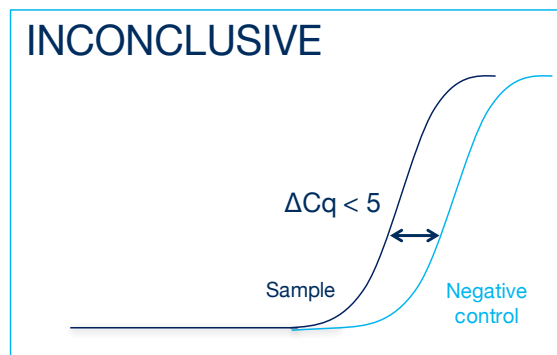
+ / -	+ / -	+	≤ 35	<b>EXPERIMENT FAILED</b> due to test contamination
+ / -	+ / -	+	> 35	*
-	-	+	-	<b>SAMPLE PREPARATION FAILED</b>
+ / -	+ / -	-	+ / -	<b>EXPERIMENT FAILED</b>

Positive control template (**RED**) is expected to amplify between Cq 16 and 23. Failure to satisfy this quality control criterion is a strong indication that the experiment has been compromised.

\*Where the test sample is positive and the negative control is positive with a Cq > 35, the sample must be reinterpreted based on the relative signal strength of the two results:



If the sample amplifies > 5 Cq earlier than the negative control then the sample should be reinterpreted (via the table above) with the negative control verified as negative.



If the sample amplifies < 5 Cq earlier than the negative control then the positive sample result is invalidated and the result should be determined inconclusive due to test contamination. The test for this sample should be repeated.

## Internal PCR control

The Cq value obtained with the internal control will vary significantly depending on the extraction efficiency, the quantity of DNA added to the PCR reaction and the individual machine settings. Cq values of  $28 \pm 3$  are within the normal range. When amplifying a Celery/Celery sample with a high genome copy number, the internal extraction control may not produce an amplification plot. This does not invalidate the test and should be interpreted as a positive experimental result.