VALIDATION

Anisus vorticulus qPCR detection kit

SYL128

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1. *In silico* validation

Table 1. *In silico* validation of primers and probe

Parameter	Forward primer	Reverse primer	Probe*
Length (bp)	21	20	31
GC %	33	45	35
Stability	3.3	1.4	-
T_m (°C)	56	59	67
Target region	COI (mtDNA)	COI (mtDNA)	COI (mtDNA)
Dimer formation	No	No	No
Nucleotide runs	No	No	No

*Probe labelled with FAM.

Table 2. *In silico* validation primers and probe combination

PCR product size (bp)	98
Combined dimer formation	No
***In silico* PCR on Genbank**	No direct hits in NCBI database. Closest hit of 93.7% with *Nanos binotatus*. Sequence of *Anisus vorticulus* not present in NCBI database.
Date of in silico PCR	June 2021

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2. Experimental validation

All validation experiments were conducted using the Sylphium qPCR mix and analyzed with the Applied biosystems 7300 qPCR instrument.

2.1. Analytical sensitivity, fluorescence output signal and efficiency

Standard solutions containing nominal target concentrations of 10^6, 10^5, 10^4, 10^3, 10^2, 10, and 0 target copies per reaction were analyzed at the optimal primer and probe concentrations. Fluorescence output was compared with the background signal, with a minimum 100-fold increase in fluorescence considered acceptable. Reaction conditions were optimized when fluorescence signals were insufficiently distinguishable from background noise.

The amplification efficiency of the primer and probe set was calculated from the slope of the standard curve and was considered acceptable when between 90% and 110%.

Results

Positive amplification was observed down to the lowest tested nominal concentration of **1-10 target copies per reaction**, demonstrating single-copy detection capability under the tested conditions (**Figure 1; Table 3**). The fluorescence output of positive reactions exceeded the predefined criterion of a 100-fold increase relative to the background signal.

The amplification efficiency of the assay was **95.7%**, indicating that the primer and probe set performed within the predefined acceptable efficiency range of 90-110% (**Figure 2; Table 4**).

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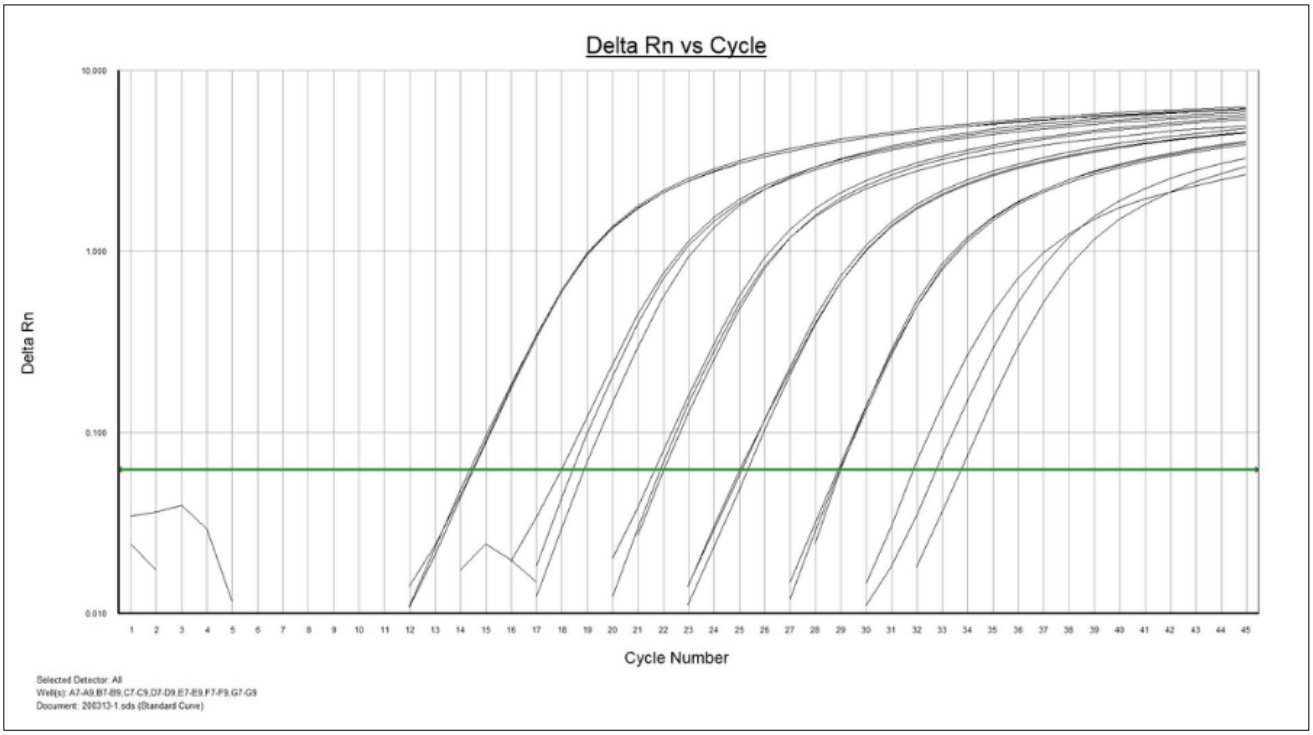


Figure 1. Amplification curves obtained at the optimal primer and probe concentrations and an annealing temperature of 57°C.

Table 3. Detection results and Cq values obtained at the optimal primer and probe concentrations and an annealing temperature of 57°C

Nominal target copies per reaction	Target detected	Mean Cq	SD
0	No	n.a.	n.a.
1-10	Yes	32.8	0.9
10^2	Yes	29.0	0.1
10^3	Yes	25.1	0.1
10^4	Yes	21.8	0.2
10^5	Yes	18.4	0.4
10^6	Yes	14.4	0.1

n.d.: not determined, very low amounts of DNA could not be quantitively detected in a reliable manner with the used qPCR instrument.

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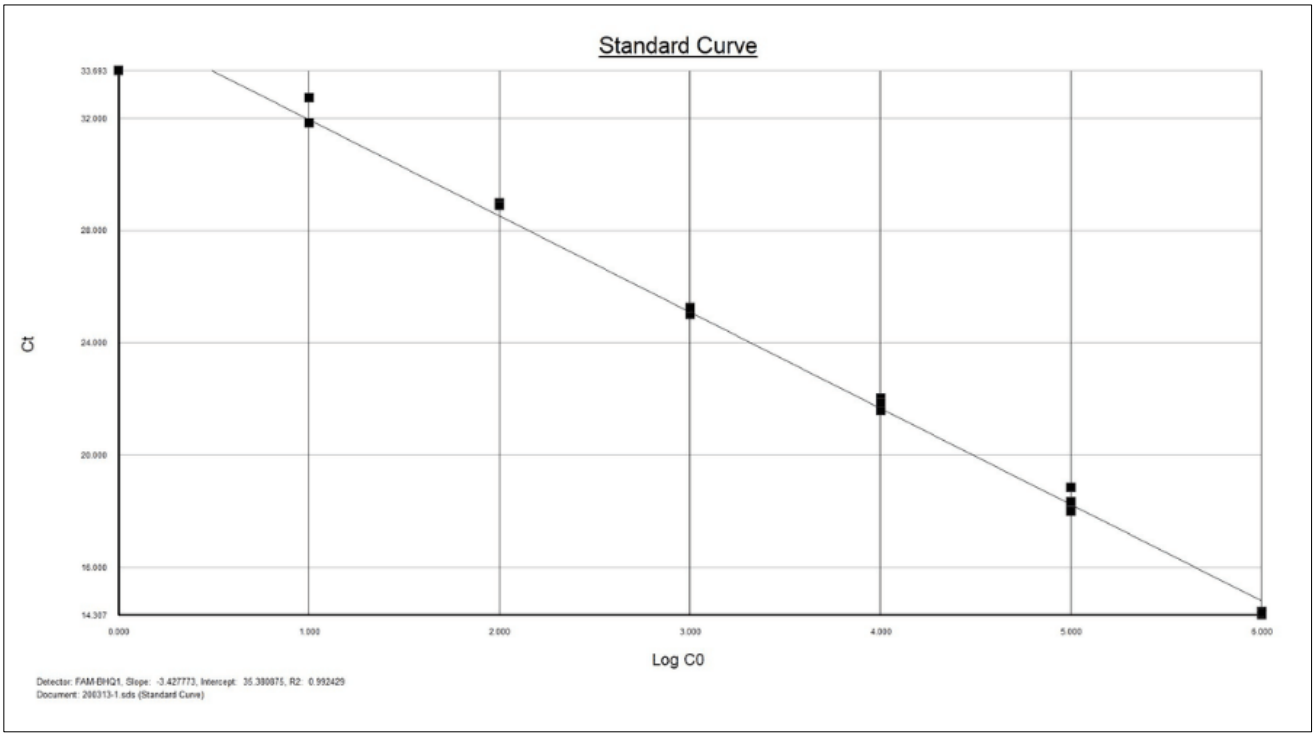


Figure 2. Standard curve generated from nominal target concentrations of 10, 10^2, 10^3, 10^4, 10^5, and 10^6 copies per reaction.

Table 4. Standard curve parameters obtained with the *Anisus vorticulus* qPCR detection kit

Parameter	Result
Slope	-3.43
Amplification efficiency (%)	95.7
R^2	0.992

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2.2. Detection confirmation of *Anisus vorticulus* in environmental samples

The amount of eDNA released by a target organism into the environment depends on the target species, the environmental conditions, and season (CEN / TC230-water analysis, proposal documented in N 1229). Samples were collected with the **SYL009 Complete eDNA sampling set** and eDNA was isolated using the **SYL002 Environmental DNA isolation kit**.

Results:

The kit SYL128 - *Anisus vorticulus* detection kit successfully detected *Anisus vorticulus* DNA in environmental samples from different locations in the Netherlands when 100-200 mL of water was filtrated.

PCR products obtained from positive environmental samples were analyzed by Sanger sequencing. No BLAST hits were found above 97%, which indicated the absence of *Anisus vorticulus* sequences in Genbank. The obtained sequences were 100% identical with the sequence Sylphium was able to extract from *Anisus vorticulus* specimen. No amplification was observed in the tested target-organism-free environmental samples.

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