VALIDATION

Aeshna viridis qPCR detection kit

SYL130

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molecular ecology

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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)	30	24	43
GC %	36	33	25
Stability	1.1	2.0	-
T_m (°C)	63	55	70
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)	138
Combined dimer formation	No
***In silico* PCR on Genbank**	*Aeshna viridis,*, *Phimodera lapponica*
Date of in silico PCR	May 2022

Conclusion:

With the exception of *Phimodra lapponica*, only the target organism was identified during the *in silico* analysis, with no predicted amplification of other non-target taxa.

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2. Experimental validation

All validation experiments were conducted using the Sylphium qPCR mix and analyzed with Applied biosystems 700 qPCR instrument.

2.1. Analytical sensitivity, fluorescence output signal and efficiency

Standard solutions containing nominal target concentrations of 10^5, 10^4, 10^3, 10^2, 10, 1 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 target copy 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 **96.5%**, 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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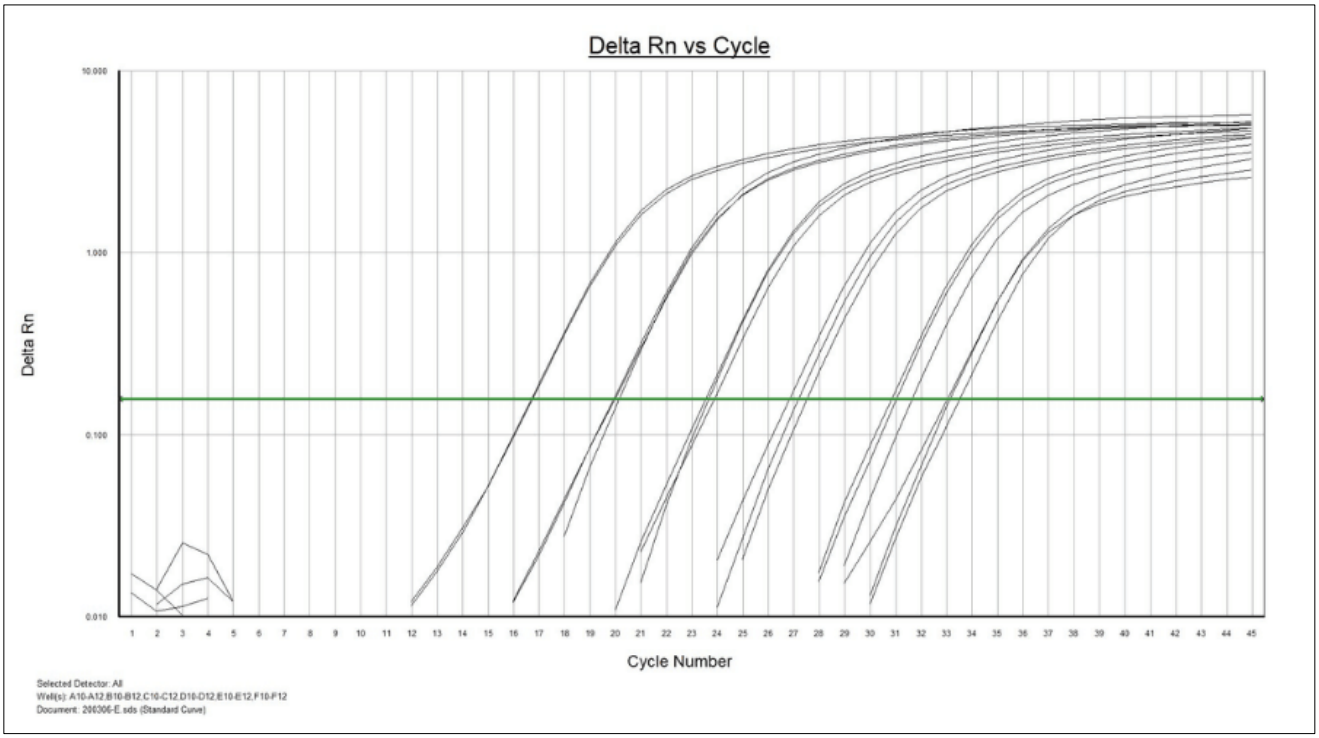


Figure 1. Amplification curves obtained at the optimal primer and probe concentrations and an annealing temperature of 58°C.

Table 3. Detection results and Cq values obtained at the optimal primer and probe concentrations and an annealing temperature of 58°C

Nominal target copies per reaction*	Target detected	Mean Cq ± SD
0	No	-
1	Yes	33.2 ± 0.2
10	Yes	31.2 ± 0.4
10^2	Yes	27.1 ± 0.3
10^3	Yes	23.6 ± 0.2
10^4	Yes	20.0 ± 0.1
10^5	Yes	16.7 ± 0.0

***As estimated by gel electrophoresis.

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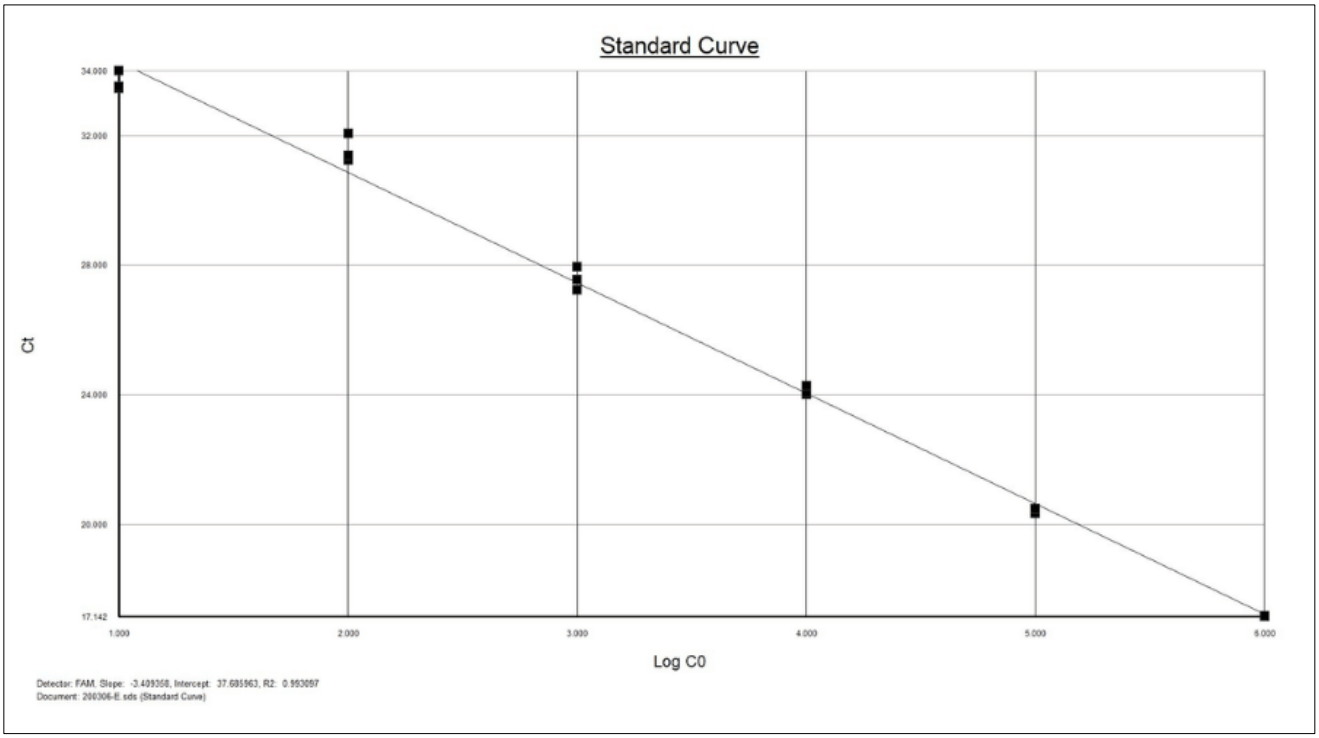


Figure 2. Standard curve generated from nominal target concentrations of 1, 10, 10^2, 10^3, 10^4, and 10^5 copies per reaction.

Table 4. Standard curve parameters obtained with the *Aeshna viridis* qPCR detection kit

Parameter	Result
Slope	-3.41
Amplification efficiency (%)	96.5
R^2	0.993

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2.2. Detection confirmation of *Aeshna viridis* 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 two Sterivex filters and eDNA was isolated using the **SYL002 Environmental DNA isolation kit**.

Results:

The kit SYL130 - *Aeshna viridis* detection kit successfully detected *Aeshna viridis* DNA in environmental samples from locations in the Netherlands where the presence of *Aeshna viridis* was suspected when 350 mL of water was filtrated.

PCR products obtained from positive environmental samples were analyzed by Sanger sequencing. The resulting sequences were identical, and BLAST analysis confirmed that the amplified products originated from *Aeshna viridis*. No amplification was observed in the tested target-organism-free environmental samples.

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