



ImmunoStrip® Validation Report

On-site Plant Pathogen Testing

Citrus tristeza virus (CTV)

ISK/STX 78900

ImmunoStrip®

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Test Characteristics

Test Name	Citrus tristeza virus	Capture Antibody	Monoclonal (Mouse)
Catalog Number	78900	Detection Antibody	Monoclonal (Mouse)
Acronym	CTV	Format	Lateral Flow Device
Genus	Closterovirus	Diluents	SEB1
Binomial Name	Closterovirus tristezae	Sample Dilution	1:20

Summary

The Citrus tristeza virus (CTV) ImmunoStrip is used to detect the presence of CTV in citrus leaves, young shoots, and petioles. The CTV ImmunoStrips are not recommended for woody tissue. ImmunoStrips are the perfect screening tool for use in the field, greenhouse, and the lab. This test has been proven to detect over 35 CTV isolates from all over the world, however, it cannot differentiate mild and severe strains.

Diagnostic Sensitivity

True Positives	35
Correct Diagnoses	35
Percent	100%

Analytical Sensitivity

Limit of Detection: 1:10,000 dilution of infected tissue (pathogen titer unknown)

Analytical Specificity

Inclusivity:

Isolates and Geographic Regions Detected:

CTV-106	CTV-107 (CA, USA)
CTV-162 (CA, USA)	CTV-519 (CA, USA)
CTV-FL216	CTV-FL278 (FL, USA)
CTV-T30 (FL, USA)	CTV-T36 (FL, USA)

Exclusivity:

Cross-reacts With:

None known	
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Does Not Cross-react With:

Carnation necrotic fleck virus (CNFV)	Grapevine leafroll-associated virus 2 (GLRaV-2)
Spiroplasma citri (Sc)	Xanthomonas axonopodis pv. citri (Xac)
Xanthomonas axonopodis pv. citrumelo	Xylella fastidiosa (Xf)

Diagnostic Specificity

True Negatives 22
Correct Diagnoses 22
Percent 100%

Selectivity:

No Matrix Effect Observed With:			
Calamondin leaves	Calamondin petioles	Fairchild tangerine leaves	Fairchild tangerine petioles
Kabosu leaves	Kabosu petioles	Kaffir lime leaves	Kaffir lime petioles
Lime leaves	Lime petioles	Naranja tamaulipas leaves	Naranja tamaulipas petioles
Naranja valencia leaves	Naranja valencia petioles	Tresca leaves	Tresca petioles

The hosts on the above list have been chosen to represent those which historically cause a range of matrix effects, in addition to those expected to be screened for this pathogen. Not all plant species susceptible to this pathogen have been screened, but may still be used with this assay unless otherwise noted below. As with all diagnostic tools, Agdia recommends confirming all results with a secondary detection method before making any economic decisions (ex: discarding plants due to positive test results, etc.).

Repeatability

Number of Samples 57
Replicates per Sample 2 - 4
Total Replicates 166
Replicates in Agreement 166
Percent Agreement 100%

Glossary

Diagnostic sensitivity¹:	The percentage of positive samples correctly identified in an experiment with known positive controls.
Diagnostic specificity¹:	The percentage of negative samples correctly identified in an experiment with known negative controls.
Analytical sensitivity²:	The smallest amount of target that can be detected reliably (this is sometimes referred to as the 'limit of detection')
Analytical specificity²:	(comprises inclusivity and exclusivity)
Inclusivity³:	The performance of a test with a range of target isolates covering genetic diversity, different geographical origin and/or hosts associated with the target organism.
Exclusivity³:	The performance of a test with a range of non-targets (e.g. cross-reaction with closely related organisms, contaminants)
Selectivity²:	The level of effect that matrices and relevant plant parts have on the performance of the assay.
Repeatability²:	The agreement between test replicates of the same sample tested by the same operator.
Reproducibility³:	The ability of a test to provide consistent results when applied to aliquots of the same sample tested under different conditions (e.g. time, users, equipment, location)
Robustness^{1,3}:	The extent to which varying test conditions (e.g. temperature, volume, change of buffers) affect the established test performance values. May also be referred to as planned deviation analysis.
Stability¹:	The performance of test reagents or controls over time.

References:

- ¹Groth-Helms, D., Rivera, Y., Martin, F. N., Arif, M., Sharma, P., Castlebury, L. A. (in press). Terminology and Guidelines for Diagnostic Assay Development and Validation: Best Practices for Molecular Tests. PhytoFrontiers.
- ²Eads, A., Groth-Helms, D., Davenport, B., Cha, X., Li, R., Walsh, C., Schuetz, K., (in press). The Commercial Validation of Three Tomato Brown Rugose Fruit Virus Assays. PhytoFrontiers.
- ³EPPO (2018) PM 7/76 (5) Use of EPPO Diagnostic Standards, EPPO Bulletin 48, 373– 377.