



Product Information: DAS-ELISA

Tomato brown rugose fruit virus (ToBRFV)

Tomato brown rugose fruit virus (ToBRFV), also known as „Jordan virus“, has been present in Israel since 2014 and was first discovered in 2015 in Jordan (1) and 2017 in Israel (2). In Europe, ToBRFV was first reported in Germany in 2018 (3). Since then, reports of infections have been accumulating across Europe but also on other continents (amongst others: Mexico, USA, China). ToBRFV belongs to the genus of *Tobamovirus* and was shown to have resistance-breaking properties against other *Tobamoviruses*, such as tobacco mosaic virus (TMV) or tomato mosaic virus (ToMV) (2).

ToBRFV causes different symptoms in different varieties. Observed symptoms include yellow or brown, wrinkled spots on fruits, narrowing and mosaic discolorations of leaves as well as deformed or irregularly ripened fruits.

Host plants for ToBRFV mainly include tomatoes (*Solanum lycopersicum*) and peppers (*Capsicum* spp.). According to current knowledge, potato (*Solanum tuberosum*) is not a host plant of ToBRFV. In September 2020, the European and Mediterranean Plant Protection Organization (EPPO) approved the addition of ToBRFV to the EPPO A2 list of pests recommended for regulation as quarantine pests.

Specificity and sampling instruction

This product can be considered as screening diagnostic tool. The DAS-ELISA reagents (4) contain polyclonal antibodies developed against a ToBRFV isolate from tomato (Germany). The reagent is suitable for detecting ToBRFV in plant leaves, seeds and fruits. All isolates of ToBRFV tested so far can be detected (isolates from locations in Germany (3), Italy, Netherland, Switzerland and Israel). The antibody shows cross-reactivity with the *Tobamoviruses* TMV, ToMV and pepper mild mottle virus (PMMoV). Cross reactivity with other *Tobamoviruses* is possible. No cross reactivity was observed with the *Tobamovirus* cucumber green mottle mosaic virus (CGMMV). Leaf and fruit samples are homogenized 1:20 (w/v) in extraction buffer «General» (Art. No. 110120). Seed samples are soaked at 4°C for 4 hours in extraction buffer «General» 1:25 (w/v) followed by homogenization.

The product is based on antibodies developed by the Leibniz Institute DSMZ GmbH, Braunschweig, Germany.

Sensitivity

The sensitivity of the ToBRFV DAS-ELISA is very high. The virus is well detected in infected plant tissue at the recommended dilution (1:20 (w/v)). The analytical sensitivity (relative) in leaves, fruits and seeds was measured by serial dilution of infected tissue as indicated in the table below:

Plant	Sample Type	Degree of infection	Analytical sensitivity
Tomato	Leaves	Highly infected	Up to 1:1.2*10 ⁶ dilution
Pepper	Leaves	Highly infected	Up to 1:1.2*10 ⁶ dilution
Tomato	Fruit	infected	Up to 1:1.4*10 ⁶ dilution
Tomato	Seeds	100%	Up to 1:3.9*10 ⁶ dilution
Tomato	Seeds	40%	Up to 1:3.9*10 ⁵ dilution
Tomato	Seeds	10%	Up to 1:4.4*10 ⁴ dilution
Tomato	Seeds	1%	Up to 1:1.5*10 ⁴ dilution

Information on the antibodies

Coating IgG: polyclonal; conjugate: polyclonal

References

- (1) Salem N., Mansour A., Ciuffo M., Falk B., Turina M. 2016. A new tobamovirus infecting tomato crops in Jordan. *Arch Virol.* 161(2):503–6.
- (2) Luria, N., Smith, E., Reingold, V., Bekelman, I., Lapidot, M., Levin, I., Elad, N., Tam, Y., Sela, N., Abu-Ras, A. and Ezra, N., 2017. A new Israeli Tobamovirus isolate infects tomato plants harboring Tm-22 resistance genes. *PLoS one*, 12(1), p.e0170429.
- (3) Menzel W., Knierim D., Winter S., Hamacher J., Heupel M. 2019. First report of tomato brown rugose fruit virus infecting tomato in Germany. *New Disease Reports* 39:1.
- (4) Clark, M.F., and Adams, A.N. 1977. Characteristics of method of enzyme-linked immunosorbent assay for the detection of plant viruses. *J. gen. Virol.* 34:475-483.

Ordering Information

BIOREBA offers the following formats:

Individual ELISA reagents for 96, 480 or 960 assays: IgG and/or conjugate for the working volume of 200 µl/test/well.

Reagent sets for 480 or 960 assays: IgG and conjugate, positive and negative controls, and microtiter plates (F-96) for a working volume of 200 µl/test/well.

Complete kits for 96, 480 or 960 assays: All reagents, controls, microtiter plates (F-96), buffers, and substrate necessary for a working volume of 200 µl/test/well.

ELISA buffers, equipment for sample preparation and disposables are also available.

For all Art. No. please refer to our product catalogue or our homepage www.bioreba.com and for prices and further information on any other product from BIOREBA, please contact your local distributor or our office in Switzerland.