

## Soybean Dwarf Virus (SbDV)-TAS ELISA Kit

**Catalog #:** V155

**Source Antibody:** A rabbit polyclonal antibody for capture and a monoclonal antibody as detection.

**Test Format:** TAS ELISA

**Reactivity:** The test reacted with all SbDV isolates tested. Reaction of the ELISA is moderate strong. Optical Density at 405 nm is in arrange of 0.800 - >2.600 depending on the virus titer in the samples tested.

**Sensitivity:** Sensitivity of the ELISA is moderate high. The virus can be consistently detected in infected plant tissues diluted at 1:810.

**Specificity:** There is no cross reaction with healthy plant tissues such as soybean or other host plants. Background is very on all of the negative control wells.

### Background Information:

**Name:** Soybean Dwarf Virus

**Acronym:** SbDV

**Genus:** Luteovirus

**Synonyms:** subterranean clover red leaf luteovirus

**Main host plants and diseases:** Symptoms persist.

- *Glycine max*, *Trifolium pratense* - puckering, rugosity and yellowing, stunting.
- *Pisum sativum* - mild yellowing of older leaves.
- *Phaseolus vulgaris* - yellowing of leaves and stunting.
- *Gomphrena globosa*, *Erodium moschatum*, *Trifolium subterraneum*, *Vicia sativa*, *Calandrinia caulescens* - leaf reddening.
- *Beta vulgaris*, *Lupinus albus*, *Lupinus angustifolius*, *Medicago polymorpha* - leaf yellowing.
- *Trifolium repens*, *T. pratense* - no symptoms.
- *Vicia faba*, *Vicia articulata* - leaf yellowing, rolling.

**Transmission:** Virus not transmitted by mechanical inoculation; not transmitted by contact between plants; not transmitted by seed.

## Components:

| Catalog | Size | Item                                      |               |                |                     |                   |                         |          |          |                                                           |          |          |              |
|---------|------|-------------------------------------------|---------------|----------------|---------------------|-------------------|-------------------------|----------|----------|-----------------------------------------------------------|----------|----------|--------------|
|         |      | Buffers for DAS/TAS, alkaline phosphatase |               |                |                     |                   |                         |          | Coating  | Detecting                                                 | Control  |          | 96-wells     |
|         |      | Coating<br>Buffer,<br>10×                 | SB1<br>Buffer | PBST<br>Buffer | ECB1<br>Buffer, 10× | PNP<br>Buffer, 5× | PNP tablet,<br>5mg each | Tween-20 | Antibody | conjugate,<br>Alkaline<br>Phosphatase<br>(Bottle A and B) | Negative | Positive | ELISA Plates |
| M004-1  | 500  | 6mL                                       | 11.6g         | 28.7g          | 6mL                 | 10mL              | 10                      | 6.5g     | —        | —                                                         | —        | —        | —            |
| M004-2  | 1000 | 12mL                                      | 23.2g         | 57.23g         | 12mL                | 20mL              | 20                      | 13g      | —        | —                                                         | —        | —        | —            |
| M004-3  | 5000 | 60mL                                      | 116g          | 286.15g        | 60mL                | 100mL             | 100                     | 65g      | —        | —                                                         | —        | —        | —            |
| V155-C1 | 500  | —                                         | —             | —              | —                   | —                 | —                       | —        | 0.25mL   | —                                                         | —        | —        | —            |
| V155-C2 | 1000 | —                                         | —             | —              | —                   | —                 | —                       | —        | 0.5mL    | —                                                         | —        | —        | —            |
| V155-C3 | 5000 | —                                         | —             | —              | —                   | —                 | —                       | —        | 2×1.25mL | —                                                         | —        | —        | —            |
| V155-D1 | 500  | —                                         | —             | —              | —                   | —                 | —                       | —        | —        | 0.25mL (A)<br>0.25mL (B)                                  | —        | —        | —            |
| V155-D2 | 1000 | —                                         | —             | —              | —                   | —                 | —                       | —        | —        | 0.5mL (A)<br>0.5mL (B)                                    | —        | —        | —            |
| V155-D3 | 5000 | —                                         | —             | —              | —                   | —                 | —                       | —        | —        | 2×1.25mL (A)<br>2×1.25mL (B)                              | —        | —        | —            |
| V155-K1 | 500  | 6mL                                       | 11.6g         | 28.7g          | 6mL                 | 10mL              | 10 tablets              | 6.5g     | 0.25mL   | 0.25mL (A)<br>0.25mL (B)                                  | 1        | 1        | 5            |
| V155-K2 | 1000 | 12mL                                      | 23.2g         | 57.23g         | 12mL                | 20mL              | 20 tablets              | 13g      | 0.5 mL   | 0.5mL (A)<br>0.5mL (B)                                    | 1        | 1        | 10           |
| V155-N1 | 18   | —                                         | —             | —              | —                   | —                 | —                       | —        | —        | —                                                         | 1        | —        | —            |
| V155-P2 | 18   | —                                         | —             | —              | —                   | —                 | —                       | —        | —        | —                                                         | —        | 1        | —            |
| V155-R1 | 500  | —                                         | —             | —              | —                   | —                 | —                       | —        | 0.25mL   | 0.25mL (A)<br>0.25mL (B)                                  | —        | —        | 5            |
| V155-R2 | 1000 | —                                         | —             | —              | —                   | —                 | —                       | —        | 0.5 mL   | 0.5mL (A)<br>0.5mL (B)                                    | —        | —        | 10           |
| V155-R3 | 5000 | —                                         | —             | —              | —                   | —                 | —                       | —        | 2×1.25mL | 2×1.25mL (A)<br>2×1.25mL (B)                              | —        | —        | 50           |
| V155-R4 | 100  | —                                         | —             | —              | —                   | —                 | —                       | —        | 0.05mL   | 0.05mL (A)<br>0.05mL (B)                                  | —        | —        | 1            |
| Storage |      | RT                                        | RT            | RT             | RT                  | 4°C               | -20°C                   | RT       | 4°C      | 4°C                                                       | -20°C    | -20°C    | RT           |

## Safety and Storage:

Wear protective gloves, clothing, eye, and face protection. Wash hands thoroughly after handling. Prevent direct skin and eye contact with, or ingestion of, product components. Obtain medical attention in case of accidental ingestion of reagent components. All reagent components should be stored at the recommended temperature to assure their full shelf life.

Store all buffers at room temperature, except for PNP Substrate Buffer at 4 °C and the PNP tablets at -20 °C under dark. Store the prepared 1x buffers at 2-6 °C refrigerator. The 1x buffers can be store up to 3 months.

## Test Preparation:

- Check all the components in the ELISA Kit.
- Make sure all laboratory equipment and facilities required for the test are ready.
- Prepare a humid box for incubation steps.
- Make a copy of the attached recording sheet and create a loading diagram by recording the locations of your samples, controls, and other reagents needed.

## Buffer Preparation:

- Preparing 1x Buffer from Concentrate:

To prepare the 1x buffer, dilute the concentrated buffers at 1:10 (Coating and Conjugate buffers), and 1:5 (PNP buffer) with D.H<sub>2</sub>O. Pour all the content into D.H<sub>2</sub>O and stir the diluted buffers for 10-30 minutes for mixing well and dissolving completely. If only part of the concentrated buffer being used, stir or mix the buffer first before pipetting.

- Preparing 1x Buffer from Powder:

To prepare the 1x buffer, dissolve the powder buffer into D.H<sub>2</sub>O at the ratio on the table below. For sample buffer, mix the powder with small amount of D.H<sub>2</sub>O into a paste (no lumps) before adding more D.H<sub>2</sub>O. Stir for 10-30 minutes for dissolving completely, and make up to final volume.

|               | 1×Sample Buffer |       |        | 1×TBST Buffer |       |        |
|---------------|-----------------|-------|--------|---------------|-------|--------|
| Buffer Powder | 11.6g           | 23.2g | 115.7g | 28.7g         | 57.3g | 286.5g |
| Tween-20      | 5.0g            | 10.0g | 50.0g  | 1.5g          | 3.0g  | 15.0g  |
| Final Volume  | 0.5L            | 1L    | 5L     | 3L            | 6L    | 30L    |

**Using the buffers:** For detail information on using the buffers for preparing reagents, refer to the Test Instructions included in the ELISA Reagents and/or Kits.

### Coating Plate with Antibody:

- Lay out all items that will be required for the plate coating step before beginning. Prepare coating antibody in a container made of glass, polyethylene or any material that does not readily bind coating antibody. Coat the plate immediately after preparing the coating antibody. Some coating antibody can be lost if too much time elapses between diluting the coating antibody and coating the plate.
- The volume of coating buffer required depends on the number of test wells used; 100 µl is needed per test well. One way to estimate the volume needed is to prepare 1 ml of coating buffer for each 8-well strip used, or 10 ml for each 96-well plate.
- Dilute the concentrated coating antibody into coating buffer at the dilution given on the label. Mix well. Always prepare coating antibody immediately before use.
- Pipette 100 µl of coating antibody into each well.
- Incubate the plate in a humid box for overnight in the refrigerator (4 °C) or 4 hours at room temperature (21-24 °C).

### Samples Preparation:

- Select symptomatic and/or infective tissues for the test. Leaf tissue is often used in ELISA testing. Plant tissues such as stem, sprout, seed, tuber, root and others can also be used.
- Buffer SB1 can be used as extraction buffer for most of the plant samples. However, other buffers are also recommended for some plant species.
- Grind sample with a mortar and pestle, or other grinding device. If you are using a mortar and pestle, wash and rinse it thoroughly between samples.
- If you extract plant sap, dilute the sap into sample extraction buffer at a ratio of 1:10 (sap volume: buffer volume). Or you can grind plant tissue in extraction buffer at a 1:10 ratio (tissue weight: Extraction Buffer volume).

### Plate Washing:

- Wash the plate when the incubation is complete. Use a quick flipping motion to empty the wells into a sink or waste container.
- Wash the plate by filling the wells with PBST, then quickly emptying them again. Repeat 4 to 6 times.
- To remove drops of PBST from the wells after washing, hold the frame upside down and tap firmly on a folded paper towel.

### Sample Dispensing and Incubation:

- About 100  $\mu$ l of diluted sample extract is needed per test well. Always have an additional amount to assure easy dispensing. A convenient way to prepare this diluted sample is to measure 100  $\mu$ l of undiluted sap into a small test tube, then add 1 ml of extraction buffer.
- Following your loading diagram on your recording sheet, dispense 100  $\mu$ l of prepared sample into sample wells. Dispense 100  $\mu$ l of positive control into positive control wells, and dispense 100  $\mu$ l of negative control or extraction buffer into negative control wells.
- Put the plate inside the humid box and incubate for 2.5 hours at room temperature (21-24 °C) or overnight in the refrigerator (4 °C).

### Preparing Enzyme Conjugate:

- Always make enzyme conjugate solution within 10 minutes before use. Prepare the enzyme conjugate, using buffer ECB1 and a cleaning container.
- The volume of buffer ECB1 required depends on the number of test wells used; 100  $\mu$ l are needed per test well. To estimate the volume needed, prepare 1 ml for each 8-well strip used, or 10 ml for each 96-well plate.
- The volume of enzyme conjugate required for each test is calculated based on the volume of buffer ECB1 used and, on the dilutions, given on the bottles. Use a new, sterile pipette tip and change the tip for each pipetting to prevent contamination.
- First dispense appropriate volume of buffer ECB1 into a cleaning container, then add enzyme conjugate from bottle A and bottle B according to the dilution given on the label. For example, if the dilutions given on bottles A and B are both 1:200 and you are preparing 2 ml of enzyme conjugate, you should first dispense 2 ml of ECB1 buffer. Then add 10  $\mu$ l from bottle A and 10  $\mu$ l from bottle B to the ECB1 buffer.

- After adding the conjugates from bottles A and B, mix the conjugate solution thoroughly. If you prepare the conjugate in a test tube, invert it several times. If you prepare the conjugate in a beaker, stir the conjugate solution with a glass rod. It is important to mix the enzyme conjugate well for a consistent test result.
- Prepare enzyme conjugate just before use. Keep the prepared enzyme conjugate at a safe place and use it after washing the plate.

### Plate Washing:

- Wash the plate 6 to 8 times with PBST as instructed above.

### Enzyme Conjugate Incubation:

- Dispense 100 µl of prepared enzyme conjugate per well for all test wells.
- Incubate the plate in the humid box for 2.5 hours at room temperature (21-24 °C).

### Preparing Substrate Solution:

- Concentration of PNP in substrate is 1 mg/ml. Each PNP tablet will make 5 ml of PNP solution, which is enough for 48 test wells or five 8-well strips.
- Prepare PNP substrate about 10-15 minutes before the end of the above incubation step. Measure 5 ml of buffer PNP for each tablet, then add the PNP tablets to the buffer. Mix by vortexing or stirring to let the PNP tablet fully dissolve in the buffer.

### Plate Washing:

- Wash the plate 6 to 8 times with PBST as instructed above.

### Incubation with Substrate:

- Dispense 100 µl of PNP substrate solution per well.
- Incubate the plate for 30 to 60 minutes in a humid box at room temperature (21-24 °C).
- To stop reaction, add 50 µl of 3M sodium hydroxide to each well (optional). The plate can be interpreted visually or with a plate reader without adding the stop solution.

### Evaluating Results:

- Test results can be examined by eye, or measured on a plate reader at 405<sub>nm</sub>.
- Development of yellow color in test wells indicate positive results. Wells in which there is no significant color development indicate negative results. Test results are valid only if positive control wells give a positive result and negative control wells remain clear.
- Results may be interpreted after more than 60 minutes of incubation as long as negative control wells remain virtually clear.

### Notes:

- We suggest that each test well be used for only one sample. In some cases, composites of up to ten leaves per test well can be used to make testing more economical. However, too many plant samples per well can reduce the sensitivity of the test.
- Do not touch the PNP tablets or expose the PNP solution to strong light. Light or contamination could cause background color in negative wells.
- If you have any questions about sampling, sample preparation, or the appropriate extraction buffer for your samples, please contact [info@nanodiaincs.com](mailto:info@nanodiaincs.com).
- All reagents are recommended for research only.

### Buffer Formulation:

| Coating Buffer (Adjust pH to 9.6, Store at 4°C) |           |
|-------------------------------------------------|-----------|
| Reagent                                         | Quantity  |
| Sodium carbonate (anhydrous)                    | 1.60g     |
| Sodium bicarbonate                              | 2.92g     |
| Sodium azide                                    | 0.2g      |
| Distilled water                                 | To 1000mL |

| PBST Buffer (Adjust pH to 7.3)             |           |
|--------------------------------------------|-----------|
| Reagent                                    | Quantity  |
| Sodium phosphate, dibasic, (anhydrous)     | 1.15g     |
| Potassium phosphate, monobasic (anhydrous) | 0.2g      |
| Sodium chloride                            | 8.0g      |
| Potassium chloride                         | 0.2g      |
| Tween-20                                   | 0.5g      |
| Distilled water                            | To 1000mL |

| SB1 Buffer (Adjust pH to 7.3, Store at 4°C) |           |
|---------------------------------------------|-----------|
| Reagent                                     | Quantity  |
| Powdered egg (chicken) albumin, Grade II    | 2.0g      |
| Polyvinylpyrrolidone (PVP) MW, 24-40,000    | 10.0g     |
| Sodium sulfite (anhydrous)                  | 1.3g      |
| Sodium azide                                | 0.2g      |
| Tween-20                                    | 10.0g     |
| 1X PBST.                                    | To 1000mL |

| ECB1 Buffer (Adjust pH to 7.3, Store at 4°C) |           |
|----------------------------------------------|-----------|
| Reagent                                      | Quantity  |
| Bovine serum albumin (BSA)                   | 2.0g      |
| Polyvinylpyrrolidone (PVP) MW 24-40,000      | 10.0g     |
| Sodium azide                                 | 0.2g      |
| 1X PBST                                      | To 1000mL |

| PNP Buffer (Adjust pH to 9.8 with hydrochloric acid, Adjust final volume to 1000 mL with distilled water. Store at 4°C) |          |
|-------------------------------------------------------------------------------------------------------------------------|----------|
| Reagent                                                                                                                 | Quantity |
| Diethanolamine                                                                                                          | 97.0mL   |
| Magnesium chloride                                                                                                      | 0.1g     |
| Sodium azide                                                                                                            | 0.2g     |
| Distilled water                                                                                                         | To 800mL |

## RECORDING SHEET FOR ELISA

TEST: \_\_\_\_\_ DATE: \_\_\_\_\_ BY: \_\_\_\_\_

TIMING: Coating: \_\_\_\_\_ Sample: \_\_\_\_\_ EC: \_\_\_\_\_ Substrate: \_\_\_\_\_

KEY POINTS: \_\_\_\_\_

Coating Antibody: \_\_\_\_\_ ul, Coating Buffer: \_\_\_\_\_ ml,

Enzyme Conjugate: \_\_\_\_\_ ul, ECB1: \_\_\_\_\_ ml,

PNP Substrate: \_\_\_\_\_ ml

|   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|----|----|----|
| A |   |   |   |   |   |   |   |   |   |    |    |    |
| B |   |   |   |   |   |   |   |   |   |    |    |    |
| C |   |   |   |   |   |   |   |   |   |    |    |    |
| D |   |   |   |   |   |   |   |   |   |    |    |    |
| E |   |   |   |   |   |   |   |   |   |    |    |    |
| F |   |   |   |   |   |   |   |   |   |    |    |    |
| G |   |   |   |   |   |   |   |   |   |    |    |    |
| H |   |   |   |   |   |   |   |   |   |    |    |    |

### RESULTS/CONCLUSIONS:

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_