VERSION: 1.2	**DATE:** 10/2020
PATHOGEN: Maize Dwarf Mosaic Virus (MDMV)	
HOST: Maize (Zea mays)	
COMMON NAME:	
METHOD: Mz 11.1 ELISA (Iowa State University adaptation of Agdia Kit) (formerly Cb 3.1)	
METHOD CLASS: TEMPORARY STANDARD	
SAMPLE: 400 seeds	

REVISION HISTORY: 10/2020 - measurement correction on Step #10.

MATERIALS:

Antiserum: suitable for detection of MDMV (e.g. Agdia, AC Diagnostics, DSMZ, etc.)

Distilled or deionized water

Extraction and ELISA buffers

Microtiter plates: 96 well plates, suitable for ELISA

Grinder: capable of grinding seeds to fine flour

Micropipette

Micropipette tips

Microplate spectrophotometer capable of operation at 405 nm

PROCEDURE:

Preparation of ELISA plate:

1. Dilute MDMV coating antibody in coating buffer as defined by the supplier.

2. Add 100 µl of coating solution to each well.

3. Cover plates to minimize evaporation.

4. Incubate plates for 4 hours in a humid box or overnight at 4°C.

Extraction of the virus:

1. Grind 4 replicates of 100 corn seeds, per sample and add 100 ml of General Extraction Buffer.

2. OR, place 4 replicates of 100 corn seeds into 100ml of General Extraction Buffer; soak overnight at room temperature, then grind.

3. Disinfect the grinder between samples by rinsing with distilled water, followed by a rinse with a laboratory or hospital standard detergent, then a final rinse with distilled water.

Running the ELISA kit:

1. Empty coated plate and wash 3 times with PBS-Tween.

2. Pipette 100 µl of seed extract into appropriate wells.

3. Add positive and negative controls to the plate.

4. Incubate plates for 2 hours in a humid box at room temperature, overnight at 4°C or as defined by the antibody supplier.

5. Prepare enzyme conjugate dilution according to supplier directions, use within 10 minutes of preparation.

6. Remove seed extracts from the plate and wash the plate 3 to 5 times with PBS-T.

7. Add 100 µl of diluted conjugate solution to each well.

8. Incubate for 2 hours at room temperature.

9. Wash plate 6 to 8 times with PBS-T.

10. Prepare PNP substrate solution (10 mg para-nitrophenylphosphate in 10 ml substrate buffer (makes enough for 96 wells, adjust volumes if necessary).

11. Add 100 µl substrate solution to each well.

12. Incubate in the dark for 30 to 60 minutes or as specified by the manufacturer.

Evaluating ELISA plates:

Evaluate results using a spectrophotometer plate reader at 405 nm. The threshold for a positive reaction on the plate reader should be greater than 2X the negative control.

BUFFERS:

General Extraction Buffer (pH 7.4)

Sodium sulfite (anhydrous): 1.3 g

Polyvinylpyrrolidone (PVP) mol. wt. 24,000-40,000: 20.0 g

Sodium azide: 0.2 g

Egg albumin (Ovalbumin Grade II): 2.0 g

Tween-20: 20.0 g

Dissolve in 1000 ml of 1X PBST

Store at 4°C

PBST Buffer (1X, pH 7.4)

Sodium Chloride: 8.0 g

Sodium phosphate, dibasic (anhydrous): 1.15 g

Potassium phosphate, monobasic (anhydrous): 0.2 g

Potassium chloride: 0.2 g

Tween-20: 0.5 g

Dissolve in 1000 ml of distilled water

Substrate Buffer (pH 9.8)

Diethanolamine: 97 ml

Hydrochloric acid (32%): 15 ml

Add water to make to 1 liter.

Adjust pH if necessary with HCl.

ALTERNATE METHOD:

Grow-out (Williams et al., 1968; Hill et al., 1974; Mikel et al., 1984).

1. Maize seeds were planted in sterile soil and grown under various environmental conditions for different periods of time.

2. Seedlings were examined for MDMV symptoms.

3. MDMV symptoms were conformed either by inoculation of indicator plants or by ELISA.

Note: Due to the very low rates of transmission of MDMV indicated in these studies and the large numbers of seeds that would be required in a grow-out test to have any reasonable chance of detecting infected seedlings, this procedure has not been adopted as a routine seed health test for MDMV.

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