J. Mycopathol. Res. **41**(2) : 245-246 (2003)

Incidence of sweet potato mosaic virus in sweet potato (*Ipomea batatas* (L.) Lam.) in the plains of West Bengal

P. S. NATH, RAMDAS MANDI, B. K. DE AND J. TARAFDAR
Department of Plant Pathology, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia 741 252, West Bengal

Sweet potato is a very important crop; it ranked sixth among food crops in USA, Mexico and India, so far as gross area is concerned. The crop is affected by large number of diseases caused by fungi and viruses. The important virus diseases of sweet potato are feathery mottle, sweet potato yellow dwarf and sweet potato mosaic virus. Works have been done on feathery mottle and yellow dwarf virus, but very little information is available on sweet potato mosaic virus disease. There is no information on physical properties and difference in symptoms. In the present work three different types of sweet potato mosaic virus symptoms have been identified and the thermal inactivation point, dilution end point and ageing *in vitro* of the virus were determined to be between 55°C and 60°C ; 10^{-4} and 10^{-5} and 24 hours at room temperature respectively.

Key words : Sweet potato mosaic virus, thermal inactivation point, dilution end point, ageing *in vitro*

INTRODUCTION

Sweet potato is an important crop and has beenranked sixth among food crops in terms of production and is grown in USA, Mexico, India and more than 100 developing countries. It is a crop of tremendous important to the developing countries as a source of protein, calories and vitamins. India ranks sixth in area (0.14 million hectares, 0.11% gross cropped area) with production of 1.71 million tonnes annually. The main sweet potato growing states of India are Orissa, Bihar, Uttar Pradesh, West Bengal, Assam, Madhya Pradesh, Tamil Nadu and Kerala. Sweet potato had been used as a stalk food crop throughout the tropical and sub-tropical areas. It is also used as industrial raw materials for the production of syrup, starch, pectin, vinegar, noodles, textile, paper, cosmetic, adhesive and glucose etc. As tuber contains 16% starch and 4% free sugar the material can be very well used as rich source in alcohol manufacruring (Chowdhury, 1967). West Bengal has been emerging up as a potential sweet potato growing area with the present cropping system.

Sweet potato is affected by a large number of diseases like fungal bacterial and viral diseases. Among biotic stresses virus diseases are the major constraints for its production. Fourteen virus diseases have been reported and among them, the important diseases are sweet potato feathery mottle, cucumber, mosaic virus, sweet potato yellow dwarf virus and sweet potato mosaic virus (SPMV). Most of works have been done on feathery mottle virus but there is no report on the ecology of the sweet potato mosaic disease caused by sweet potato mosaic virus. The present investigation has been undertaken to determine the physical properties of the sweet potato mosaic in the plains of West Bengal.

MATERIALS AND METHODS

Sweet potato fields of All India Co-ordinated Research Project on tuber crops (other than potato) located at University Farm, Mondouri, BCKV, West Bengal were surveyed during *rabi* season (2000-2001) and plants showing SPMV infection were collected and brought to the laboratory for confirmation and determination of the physical properties of the virus viz. thermal inactivation point, dilution end point and ageing *in vitro*.

Test seedlings were inoculated with the sap collected from the leaves of typically showing SPMV symptoms following the recommended sap inoculation technique and inoclated plants were kept

in the insect proof cage until symptom appeared. After appearance of symptom on the inoculated plants, the leaves were collected and again inoculated to healthy test seedlings by same procedure for confirmation of the virus. For determination of dilution end point, standard sap was prepared from SPMV infected leaves (at room temperature approx. 25°C) and diluted up to 10^{-8} and the test seeding were inoculated by different dilution of the sap and the inoculated plants were kept in insect proof condition for development of symptom. Thermal inactivation point was determined by using standard sap from the SPMV infected leaves and exposed to different degree of temperature viz. 30°C, 35°C, 40°C, 45°C, 50°C, 55°C, 60°C, 65°C and 70°C for 10 minutes in a temperature control water bath. After heating the sap, sap was cooled immediately in an ice bath. After cooling healthy seedlings were inoculated by these saps following the usual sap inoculation technique and seedlings were kept in the insect proof cage till symptoms developed. Similarly standard sap was prepared from young leaves of SPMV infected plants and poured in conical flask and was kept at room temperature 25°C. Seven sets of sweet potato test seedlings (each set contain 10 plants) were inoculated with the sap at 0, 1, 2, 3, 10, 24 and 30 hr(s) of sap preparation and test plants were kept in the insect proof cage for development of symptoms.

RESULTS AND DISCUSSION

The cuttings of infected plants showing different symptoms were collected and brought to the laboratory and planted in earthen pots previously filled with soil and organic manure at 1:1 ratio. The different types of symptom were categorised like Type-I, Type-II and Type-III as mentioned in the Table 1. In view to establish the virus nature of the disease, the serial sap transmission was conducted on different types of mosaic symptom to the healthy sweet potato test plants under insect proof condition. From the serial sap transmission study it eas found that sap from infected leaves, when inoculated to healthy test plants, the same types of symptoms were produced in the healthy test plants in all the sets.

The data obtained from dilution end point, thermal inactivation point and ageing *in vitro* of SPMV on sweet potato varied between 20% and 73.33% at temperature between 30°C and 55°C. The virus was inactivated at 60°C temperature. The symptoms appeared at 55°C although the percentage of infection was very low (20%). At 30°C and 35°C temperature the percentage of infection was 73.33 in both the temperature. The dilution end point of the virus was between 10^{-4} and 10^{-5}. The highest infection was 76% at the dilution of 10^{-1} and 10^{-2} and 28% infection was found at 10^{-4}dilution. The sap remained infectious up to 24 hrs laboratory condition (25°C), and 40% infection was found.

Table 1 : Different types of symptoms produced by sweet potato mosiac virus infected plants.

Type of Symptom	Symptom
I	Alternate patches of dark green and light green colour with typical mosaic symptom, sharply bordered by rounded shapes, veins and veinlets became promninent and leaves are reduced in size.
II	Mosaic mottle with typical vein banding and intense yellowing of veins are prominent which appeared as general symptoms of the production of yellow net and reduced size of leaves.
III	Leaves are pale green with yellow or chlorotic areas mostly confined on the tip portion of the leaf. Chlorotic areas gradually proceeded downward. Veins and veinlets are prominent and sizes of the leaves are reduced.

From the above findings it may be concluded that the SPMV is sap transmissible and produced three different types of symptom in the plains of West Bengal and the TIP, DEP, and ageing *in vitro* of the virus is between 55°C to 60°C ; 10^{-4} to $10^{-5}$and 24 hrs in laboratory condition respectively.

Table 2 : Determination of Thermal inactivation point (TIP), Dilution end point (DEP) and Ageing *in vitro* (AV) of Sweet potato mosaic virus.

TIP Temperature at which Sap tested (°C)	Percentage of infection	Dilution of the Sap	Percentage of infection	TIP AV Temperature/hours at which Sap was kept	Percentage of infection
30	73.33	10^{-1}	76.00	25°C/0	80.00
35	73.33	10^{-2}	76.00	25°C/1	70.00
40	60.00	10^{-3}	48.00	25°C/2	60.00
45	46.66	10^{-4}	28.00	25°C/3	50.00
50	53.33	10^{-5}	0.00	25°C/4	50.00
55	20.00	10^{-6}	0.00	25°C/24	40.00
60	0.00	10^{-7}	0.00	25°C/30	0.00

REFERENCE

Chowdhury, B. (1967). *Vegetables*, National Book Trust, India, New Delhi, Pp-198.

(Accepted for publication September 24 2003)