

Original Research Article

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Transmission Studies of Soybean mosaic virus

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ABSTRACT

Keywords

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The SMV was readily sap transmissible to Soybean cv. JS-335 when the inoculum was prepared in 0.1 M phosphate buffer (pH 7.0) and produce typical symptoms such as mottling, crinkling of leaves, leaf puckering and dwarfing. The cultivar JS-335 was more susceptible to SMV than other cultivars like PK-1029 and MACS-13. The extract prepared from the leaves of soybean proved to be most infectious containing the highest concentrations of the virus as compared to the extracts obtained from other plants parts (Stem and Root).

Introduction

Soybean [*Glycine max* (L.) Merrill] ($2n = 40$), is a species of legume native to East Asia (China), widely grown for its edible bean which has numerous uses. Soybean is called as “golden bean”, “miracle bean”, “crop of the planet” “super legume” of the 21st century. It is a versatile and fascinating crop with innumerable possibilities of not only improving agriculture but also supporting industries. Soybean is known to be naturally infected by at least 50 viral diseases belonging to different groups (Sinclair, 1992). In India, so far 11 viruses have been reported to occur on soybean (Mali, 1995). Virus diseases constitute the most serious disease threat to soybean production in many tropical areas. The most common virus of soybean around the world is soybean mosaic virus (SMV). It poses a constant threat to soybean

production as it reduces the yield of field grown soybean by 25 -100 per cent. The ability of SMV to be transmitted through sap in future could become a limiting factor in expanding soybean cultivation in India. Hence, the present study was aimed to know the sap transmission means of spread of soybean mosaic virus in nature as well as under experimental conditions.

Materials and Methods

Test plants

Soybean cultivar JS-335 was used as test plant for mechanical transmission studies. These plants were raised from healthy seeds in six inch earthen and plastic pots containing the mixture of soil, sand and compost in 2:1:2

ratio (w/w) and maintained in insect proof glasshouse. Four sets or 25 plants each were used for sap inoculation at four leaf stage.

Preparation of inoculum

Young leaves with characteristic mosaic symptoms were collected separately from the glasshouse infected soybean plants and from field conditions, for preparation of inoculum. These leaves were washed in tap water and dried between folds of blotting papers. The standard extract was prepared by macerating the infected plant material in a pre-chilled pestle and mortar using 0.1 M phosphate buffer (pH 7.0) containing 0.1 per cent sodium sulphate @ 1ml/g of leaf tissue. The resultant pulp was squeezed through double layered muslin cloth. The extract thus obtained was used as a standard inoculum for inoculations.

Method of inoculation

For sap inoculation, young healthy vigorously growing seedlings were selected, a pinch of carborundum (600 mesh) was sprinkled onto leaves of test plants before inoculation as abrasive. A small piece of absorbent cotton, soaked in the extract was rubbed over the upper surface of the leaves, gently and unidirectionally. During the inoculation the leaves were supported from below by a piece

of cardboard to avoid leaf injury and to assure uniform pressure and spread of inoculum. The inoculated leaves were washed immediately with a jet of distilled water using a squeeze bottle to remove the excess inoculum and abrasive. The plants were labeled and kept under observations for symptom development up to month in insect proof cages in glass house.

Results and Discussion

The results in table 1 revealed that SMV was sap transmissible and symptoms observed even up to one month. Whereas 70 per cent of the inoculated plants developed mosaic symptoms within 9-13 days alter inoculation (Table 1) this indicates that SMV not only aphids transmitted but also sap or mechanically transmitted. The SMV was readily sap transmissible to cv. JS-335 when the inoculum was prepared in 0.1 M phosphate buffer (pH 7.0) and produce typical symptoms such as mottling, crinkling of leaves, leaf puckering and dwarfing. The cultivar JS-335 was more susceptible to SMV than other cultivars like PK-1029 and MACS-13. The rate of transmission was 68-80 per cent. Similarly several workers have reported successful transmission of SMV by sap inoculation (Ali and Hassan, 1992; Naik and Keshavmurthy, 1997; Quinones, 1969; Shafik and Al-Jubori 1987 and Singh *et al.*, 1976).

Table.1 Mechanical transmission of Soybean mosaic virus (cv.JS-335)

Expt. No.	No of plants inoculated (cv.JS-335)	No of plants infected	Percent transmission	Periods taken for symptoms expression (days)
01	25	18	72	9-13
02	25	20	80	10-14
03	25	19	76	11-13
04	25	17	68	9-12
Average	25	18.5	74	9.75-13

Table.2 Sap transmission of SMV from different plant parts

Sl. No	Extract from	Percent virus transmission
01	Leaves	49
02	Stems	24
03	Root	00

The results in table 2 revealed that the extract prepared from the leaves of soybean proved to be most infectious containing the highest concentrations of the virus as compared to the extracts obtained from other plants parts (Stem and Root). These results regarding sap transmission were in agreement with those obtained in case of soybean mosaic disease caused by SMV (Gardner and Kendrick, 1921; Nariani and Pingale, 1960; Singh, 1976; Gupta, 1975, and Naik and Murthy, 1997).

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