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Efficacy of Some Inoculating Methods for Smut Disease Development in Sugarcane

M.Iqbal, S.Rahman, A.K.M.Kabir and M.I.Talukder
Sugarcane Research & Training Institute,
Ishurdi, Pabna, Bangladesh.

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ABSTRACT

An experiment was conducted to find out the efficacy of four inoculating methods for development of smut disease in sugarcane at Sugarcane Research and Training Institute farm, Ishurdi for three consecutive years. Two varieties such as Isd 16 and Isd 17 known as resistant and susceptible respectively were selected and inoculated by spore injecting, spore suspension, spore smearing and leaf sheath methods. Control was also maintained. Out of four methods, spore injecting below the buds showed the highest infection in Isd 17 a known smut susceptible variety in all the three years. Spore injecting method showed an average infection of 27.0% followed by spore suspension and spore smearing method showing 8.5 and 6.0% infection respectively in Isd 17. Spore injecting method may be used for smut inoculation in sugarcane.

INTRODUCTION

To ascertain varietal resistance to the culmicolous smut of sugarcane, it is necessary to develop reliable methods of inciting infection. Three methods are commonly used by sugarcane pathologists in order to check the varietal resistance to smut. These are (a) natural field infection (b) exposure trials and (c) artificial inoculations. The third method has the advantage of testing large number of varieties but it tends to eliminate varieties with field resistance. According to Nasr (1977), for screening of a large number of varieties, the artificial inoculation method was found more appropriate.

Many methods of artificial inoculation have been tried successfully by many workers (Talballa, 1969; Duarte and Tokeshi, 1978). Although several methods have been tried for infecting buds in seed pieces, the spore suspension method is widely used (Durairaj *et. al.*, 1972; Satya Vir and Beniwal, 1978). Three inoculation techniques are generally used for artificial inoculation to smut. These are the dip-in, the paste and the wound-past method (Nasr, 1977). Therefore, the experiment was undertaken to find out the efficacy of some inoculating methods like spore injecting, spore suspension, spore smearing and leaf sheath method at the Sugarcane Research and Training Institute (SRTI) farm for three consecutive years.

MATERIALS AND METHODS

The experiment was conducted at SRTI farm, Ishurdi, Pabna for three consecutive years such as 1988-89 to 90-91 cropping seasons. Varieties Isd 16 and Isd 17, known as resistant and susceptible respectively were selected for the experiment and inoulations were done by spore injecting, spore suspension, spore smearing and leaf sheath method. Control was also maintained. In case of spore injecting method, smut spores were injected by the syringe through the space underneath the buds. In spore suspension method, seed pieces were immersed in smut spore suspension for half an hour and then incubated for 24 hours before planting. In spore smearing method, setts were inoculated with spore paste on the bud after removal of 2-3 bud scales. In leaf sheath method, spore solution was poured between the leaf sheath and stalk on standing cane and kept for 15 d in the field so that buds may be infected before plantation of the inoculated setts. In each year, single-bud-setts were inoculated by above four methods and then planted in polybags. After germination, about two month old settings were planted in the field. Data on smut whip emergence were recorded at an interval of 15 d starting from planting to harvesting. The same procedure was maintained for control (without inoculation). In each method, data on infected clumps were recorded and percentage of infection was calculated out on clump basis.

RESULTS AND DISCUSSION

The results on inoculation tests have been presented in the Table 1. The Table 1 shows that in the first year (1988-89), out of four methods, spore injecting below the buds showed the highest infection of 17.1% followed by 7.3 and 2.9% infection in spore smearing and spore suspension method respectively in Isd 17.

Table 1. Efficacy of different inoculation methods for artificial inoculation to smut disease of sugarcane.

Method of Inoculation	Smut infection (%) in Isd 16				Smut infection (%) in Isd 17			
	1988-89	1989-90	1990-91	Average (%)	1988-89	1989-90	1990-91	Average (%)
Spore injecting method	0	0	2.1	0.7	17.1	33.0	31.0	27.0
Spore suspension method	0	0	0	0	2.9	13.4	9.3	8.5
Spore smearing method	2.9	0	0	1.0	7.3	2.8	7.8	6.0
Leaf sheath method	0	0	0	0	0	0	0	0
Control	0	0	0	0	0	0	0	0

No smut infection was found in leaf sheath method and control in the same variety. No method was found to incite any smut infection in Isd 16 except spore smearing method which resulted 2.9% infection. In the second year (1989-90), spore injecting method again caused the highest infection of 33.0% followed by spore suspension and spore smearing method producing 13.4 and 2.8% infection respectively in Isd 17 whereas no method incited any infection in Isd 16. In this year also, no infection was found in leaf sheath method and control in Isd. 17. In the third year (1990-91), spore injecting method showed the highest infection of 31.0% followed by the spore suspension and spore smearing method causing 9.3 and 7.8% infection respectively in Isd 17. Leaf sheath method and control showed no infection in the same variety. In Isd 16, no method except spore injecting showed 2.1% infection. Considering the average of three years, spore injecting method showed the highest infection of average 27.0% followed by spore suspension and spore smearing method showing 8.5 and 6.0% infection respectively in Isd 17 whereas spore smearing and spore injecting method only showed 1.0 and 0.7% infection in Isd 16 respectively. Nasr (1977) reported that the wound-paste method proved to be a very severe i.e. most efficient method and the dip-in and the paste methods were comparable. In this case also, spore suspension and spore smearing method which are similar to dip-in and paste method respectively were found to be comparable. In this experiment, spore injecting method was found to be most effective followed by spore suspension method for inoculation.

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