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THE MODE OF SURVIVAL OF *PSEUDOMONAS SOLANACEARUM* (SMITH) SMITH CAUSING BACTERIAL WILT OF GINGER (*ZINGIBER OFFICINALE* ROSE.)

During 1978, the ginger crop in an area of 5 ha at Horticultural Research Station, Ambalavayal was affected by a new disease of bacterial origin. The causal organism was later identified to be *Pesudomonas solanacearum* (Smith) Smith biotype III of Hayward (Sarma *et al.*, 1978 and James Mathew *et al.*> 1979). The affected pseudostems and rhizomes at advanced stages of infection are slimy to touch with varying degrees of tissue disintegration and give off milky bacterial exudate when pressed gently (Sarma *et al.*, 1978). In view of rapidity of spread of the pathogen under ideal conditions which exist during monsoon and the enormous loss it can cause, a project for detailed study on the etiology, symptomatology, mode of survival of the pathogen and control measures was initiated at this station in 1979.

The experiment was aimed to ascertain whether the pathogen subsisting in soil or in the infected rhizomes forms the source of primary inoculum. Two sets of experiments were conducted. In one, seed rhizomes of Rio-de-Janeiro collected from the previous crop (positively contaminant) was planted under field condition. Seed rhizomes were divided into two lots after treating in 0.25% Agallol–3 (methoxy ethyl mercuric chloride) for 30 minutes. One lot was again treated with Plantomycin 1000 ppm to ensure freedom from the pathogenic bacterial contaminant. A plot where maximum infection was noticed during the previous season was selected for planting. Plant debris was incorporated into soil and beds of 3 x 1 m were made. The usual spacing of 20 x 25 cm and other "package of practices recommended were adopted. Antibiotic treated and untreated seed rhizomes were planted in alternate rows of beds on 27-4-1979. In all 23 beds were planted under each having a plant population of 1380 per treatment. The germination count at 45th day and disease incidence at 90th day after planting were recorded.

In another set of experiment conducted simultaneously, 25 pots of 30 cm dia. were taken and soil from infected area having diseased plant debris was filled in 10 pots. Into the other, soil collected from the same area was filled after sterilization in an autoclave at 15 lbs. p. s. i for 2 hr. The seed rhizomes of Rio-de-Janeiro collected from the previous crop were first treated in 0.25% Agallol-3 and divided into 2 lots. One lot was planted in 5 pots each of sterilized and unsterilized soil at 3 seed rhizomes/pot. The remaining lot of seed rhizomes was again treated with Plantomycin 1000 ppm and planted in 5 pots each of sterilized and unsterilized soil. Healthy rhizomes collected from disease free area and planted in 5 pots of sterilized soil formed the check. The germination count and periodical disease incidence were assessed.

The result of the studies is presented in Table 1. The results indicated that under field condition disease incidence was more pronounced in infected soil planted with untreated rhizomes than with treated rhizomes in the same soil. It might be inferred that the pathogen subsisting in soil formed the main source of primary inoculum. The marked difference in the degree of infection of pathogen in treated and unteated beds was no longer discernible after the crop has attained the tillering stage and thereafter and the entire crop has been affected within 120 days after planting. The result of the pot culture experiment (Table 1) revealed that untreated seed in infected soil favoured maximum incidence under controlled conditions, while treated rhizomes in infected soil and untreated rhizomes in sterilized soil were almost on par with regard to degree of disease incidence. Another interesting aspect noticed was that there was 26.6% infection in pots in which treated rhizomes and sterilized soil were employed. This, perhaps indicated that Plantomycin at 1000 ppm is ineffective against the seed borne bacteria. This is in agreement with the finding of Sarma *et al.* (1978). James Mathew (1979, personal communication) found that none of the available antibiotics singly is capable of containing the pathogen in the bioassay conducted. It is clear from these that *P. solanacearum* survives in soil and seed rhizomes as well and these from the potential sources of primary inoculum for the ensuing crop. Under the present study which was conducted in the soil infected in 1978, the biotype III has been found to survive in the soil for two seasons in the natural weather conditions that exist here. Lum (1973) found that both biotypes (III and IV) survived a twenty month period of severe drought in the experiment fields.

In the absence of any effective control measure against this pathogen, use of healthy rhizomes from disease free area and selection of new site or crop rotation (Pordesimo and Raymundo 1963) are to be practiced. Pegg and Moffet (1971) suggested that growers should attempt to eradicate weeds known to harbour biotype III which is highly pathogenic and other biotypes. Ishii and Aragaki (1963) suggested soil fumigation with methyl bromide at 3 lbs/100 sq. ft to get good result.

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സംഗ്രഹം

ഇഞ്ചിയെ ബാധിക്കുന്ന വാട്ടരോഗത്തിന് ഹേതുവായ അണുവിന്റെ മണ്ണിലും വിത്തിലും ഉപജീവിക്കുവാനുള്ള കഴിവിനെപ്പറ്റി പഠിച്ചതിൽ, പ്രസ്തുത അണുവിന് രണ്ടു വർഷക്കാലം മണ്ണിലും വിത്തിലും ഉപജീവിക്കുവാനും രോഗം പകർത്തുന്നതിനുള്ള കഴിവും ഉണ്ടെന്നു മനസ്സിലാക്കി. രോഗനിയന്ത്രണത്തിന് rarajaroocD^sngg വിത്ത് രോഗം ബാധിച്ചിട്ടില്ലാത്ത പുതിയ സ്ഥലത്ത് നട്ടാൽ മതിയെന്നും കണ്ടു.

Table 1

Disease incidence at 90th day after planting

Sl. No.	Treatment	No. of plants infected/treated	Disease incidence %
	Field conditions		
1	Untreated rhizomes in infected soil	615/1380	44.5
2	Treated rhizomes in infected soil	444/1380	32.2
	Pot culture		
3	Untreated rhizomes + infected soil	10/15	66.6
4	Treated rhizomes + infected soil	7/15	46.6
5	Untreated rhizomes + sterilized soil	8/15	53.3
6	Treated rhizomes + sterilized soil	4/15	26.6
7	Control - healthy rhizomes + sterilized soil	0/15	—

Horticultural Research Station,
Ambalavayal

G.INDRASENAN
V, SREEKUMAR
JAMES MATHEW
M. K. MAMMEN

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