–NH and C = 0 groups[4].

In its morphology and spore surface configuration, as seen under electron microscope, which is a constant taxonomic criterion[5-7], the actinomycete best resembles *Streptomyces albus* (Waksman and Henrici)[8-10]. But it has been designated as a new strair of *S. albus* (Agra strain), because it differs from all the existing twenty three strains[11-13] of *S. albus* in its luxurient growth and dark grey-coloured aerial mycelium on inorganic salt starch agar medium, reduction of nitrates, amylosis and also in its utilization of raffinose, rhamnose and non-utilization of xylose, fructose and lactose. The antibiotic substance produced by isolate k-32 is also found to be different from that produced by already known strains of *S. albus*.

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12 *May* 1981

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EFFECT OF CALCIUM AND MAGNESIUM ON THE SUSCEPTIBILITY OF RICE PLANTS TO BACTERIAL LEAF BLIGHT

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CALCIUM and magnesium antagonize each other in their absorption by plants. Liming of acid soils to enhance their productivity not only increases the soil pH but also supplies calcium. Heavy dressings of lime leads to magnesium deficiency, particularly in highly leached humus acid soils or on sandy soils since magnesium uptake is depressed as a result of calcium competition[1]. Similarly, heavy absorption of magnesium may result in calcium deficiency. Since the susceptibility of plants to disease is greatly influenced by mineral nutrition, the availability of these plant nutrients would affect their resistance, especially in these problem soils. Very little attention has been paid to understand the role of calcium and magnesium with regard to diseases caused by bacterial pathogens. We report here the influence of calcium and magnesium on the susceptibility of rice cultivars to *Xanthomonas campestris* Pv. *oryzae* (XCO).

Three rice cultivars, Taichung Native 1 (TN 1) sensitive, IR 8 intermediate and Malagkit Sung-Song (MSS) tolerant to bacterial leaf blight were grown in 2-l plastic pots (four seedlings per pot) containing modified Hoagland's nutrient solution[2] adjusted to supply 40 ppm of nitrogen, 10 ppm of phosphorus, 40 ppm of potassium and blanced amounts of trace elements necessary for plant growth. Calcium at 10, 20, 40, 60, 80 and 100 ppm and magnesium at 5, 20, 40, 60, 80 and 100 ppm were tested. The plants were kept under natural environmental conditions. The nutrient solution was supplied to the seedlings in four split doses, each dose comprising of one quarter strength of the solution at the age of 5, 10, 15 and 20 days. The level of the liquid in the pots was kept constant by adding distilled water at regular intervals. The pH of the culture solution was maintained at 5·0 during the growth of the plants. Each treatment was replicated three times. The second leaf from the top of 30-day-old plants was inoculated by needle puncture method[3] with cells of XCO (ca. 10^8 cells/ml) obtained from 48-hr-old cultures maintained on potato-sucrose agar slants. The downward progress in the lesion development from the point of inoculation was recorded 15 days after inoculation.

An increase in the supply of calcium significantly reduced the susceptibility of plants to XCO (figure 1) while abundant supply of magnesium markedly enchanced their susceptibility. Calcium plays an essential role in biological membranes and its deficiency obviously impairs membrane

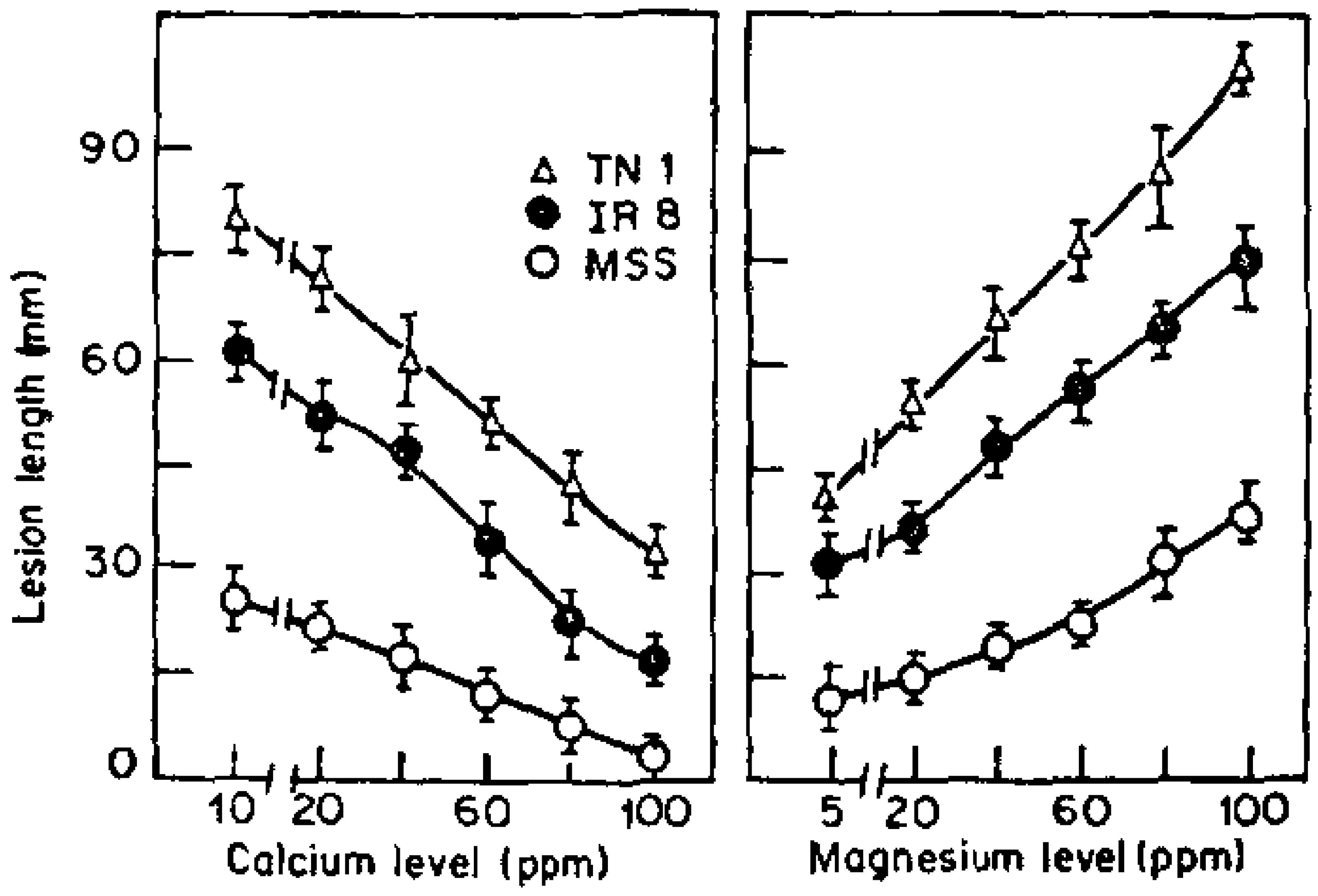

Figure 1. Susceptibility of sensitive (TN 1), intermediate (IR 8) and tolerant (MSS) rice cultivars to bacterial leaf blight at different levels of calcium and agnesium supply. Data represent the lesion length recorded 15 days after inoculation and are averages of 12 measurements. Bars indicate ± standard error.

permeability[1]. Altered membrane permeability is a characteristic early host response to XCO[4], presumably mediated by bacterial toxins and incompatible host-parasite combinations; this may accelerate the movement of water and nutrients to the infected cells, thus favouring the pathogen multiplication[5]. Evidently, in the presence of excess amounts of calcium, the pathogen is unable to disrupt the integrity of the membranes, thus reducing their susceptibility.

Magnesium has been shown earlier to augment the susceptibility of rice plants to bacterial leaf blight[6,7]. Besides, its function in the chlorophyll molecule, magnesium serves as a cofactor in almost all enzymes activating phosphorylation process and plays a vital role throughout the plant metabolism[1]. However, its precise physiological role in disease resistance is not known. Although the effect of calcium and magnesium observed in the present study is common to all the three cultivars tested, their differential reaction to the pathogen at a specific nutrient level might be related to their genetic variation in the uptake and distribution of the plant nutrients coupled with other biochemical factors governing disease resistance and this needs further research. Nevertheless, it is clear that management of this disease by careful soil amelioration in the aforesaid problem soils appears to be a plausible way to minimise the loss caused by it, especially in the absence of potent bactericides and true resistant cultivars for effective disease control.

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IN VITRO EFFICACY OF SOME FUNGICIDES ON INHIBITION OF ASCOSPORE DISCHARGE IN *VENTURIA INAEQUALIS* (COOKE) WINT

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Venturia inaequalis (Cooke) Wint., the causal organism of apple scab, starts its primary infection with two sources. One is previous year's dead scabbed leaves bearing perithecia lying on the ground; the second source is from scab lesions on young shoots and buds[1]. Both the primary sources of infection have been reported from Kashmir Valley[2,3]. The first source is more important because of its widespread occurrence[4].

In order to check the apple scab the routine spraying of various fungicides begins in Kashmir Valley when the apple tree is at green tip stage but without taking into account the phenomenon of ascospore discharge. In this way inoculum of primary source of infection remains unchecked.

Post harvest and orchard floor spray have been advocated[5-7] to reduce the inoculum of primary source of infection or delay the ascospore discharge, as such a delay in discharge of ascospores is expected to provide timely escape to young leaves which are receptive sites for ascospores and would make routine sprays more effective.

Taking into account the epidemic of apple scab on most important commercial cultivar (Red Delicious), the present investigation has been taken up to study the effect of some fungicides on ascospore discharge *in vitro*.