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Research Article

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Effect of trace elements Zn, B, Mg and Cu on the growth and sporulation of *Pyricularia oryzae*, the causal organism of blast disease of rice

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ABSTRACT

Blast is one of the most common disease of the Rice crop caused by *Pyricularia oryzae*. Blast of Rice is a recurrent problem of Rice producing countries declines productivity drastically. Mycelium growth and sporulation of *P. oryzae* is depend upon many factors i.e. humidity, temperature, availability of nutrients etc. Like other fungi *P. oryzae* also requires some nutrients in very minute quantity for their physiological and metabolic activities. Regulating these micronutrients or trace elements we can control the growth and spore production in *P. oryzae*. In this paper, we studied effect of four trace elements i.e. Zinc (Zn), Boron (B), Magnesium (Mg) and Copper (Cu) on growth and sporulation of *P. oryzae*. Zinc, Boron and Copper are most effective and promote growth and sporulation at 2 ppm (parts per million) concentration when we increased concentration of these elements in the medium, growth and sporulation decreased .On the other hand less growth and sporulation reported in the absence of Magnesium. Minute quantity of Magnesium is required for optimum growth i.e. 2 ppm. after this increasing concentration of Magnesium is not significant.

KEYWORDS: Trace element, Pyricularia, rice blast, fungal sporulation

INTRODUCTION

Roughly more than half of the world population depends on rice for their food. The major rice-producing countries are China, India, Japan, Bangladesh, Indonesia, Thailand and Myanmar (Burma). The United States Department of Agriculture (USDA) estimates that the World Rice Production 2019-2020 will be 499.31 million metric tons. Since most of the world's population dependent on rice for their food, any kind of decrease on production of the crop gives rise to a serious problem. A crop failure for any reason poses a real threat of the starvation. There are many pathogenic and environmental factors which cause different diseases on rice plant. One of the most common as well as important disease of rice is blast, caused by *Pyricularia oryzae* . The rice blast disease caused by *Pyricularia oryzae* strike all aerial part of the plant. Most infections occur on the leaves, causing diamond shape lesions with a gray or white center to appear, or on the panicles, which turn white and die before being filled with grains [1]. *Pyricularia oryzae* is highly specific to the rice plants. Blast disease was first reported in Asia more than three centuries ago and is now present in over 85 countries. It is highly adaptable to the environment. When *Pyricularia oryzae* infects rice plants and produces neck rot or panicle blast, it will either kill the host plant or prevent seed development respectively. Fungi need about 17 elements to meet their nutritional requirements [2-4]. Apart from these elements few elements are present in very small quantities, known as trace elements. The previous studies conducted by Allaway [5], Lilly [6], Bowen [7], Thind and Mira Madan [8] revealed the trace elements Zn, Fe, Mn, Cu, Mo and Ca are necessary for the growth of the almost all the fungus. There is not much literature available in the subject but some workers have worked on role of these metals on pathogenicity of different fungus. Metals Zn, Cu, Fe etc. play an important role in development of fungal disease [9] More than 400 yeast gene are involved in growth under Zn limitation [10]. The present paper deals with the requirements of Zn, B, Mg, and Cu on the growth and sporulation of *Pyricuaria oryzae* isolated from the diseased rice plant.

MATERIALS AND METHOD

Glassware

Glassware soaked in a cleaning solution (chromic acid) for a few hours and washed in tap water. They were rinsed thoroughly in