

Effects of High Voltage Plasma and Micro/Nano Bubbles on Seed Germination and Growth of Crop under Hydroponic System

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Abstract- High voltage plasma (HVP) and micro/nano bubbles (MNBs) technologies are recently becoming innovative, new research technologies. In this study, experiments were made to clarify the effects of MNBs and HVP on seed germination and evolution in crops. The results show that MNBs have stimulated seed germination of Chinese kales. Also, high voltage plasma, MNBs and HVP with MNBs have made germination faster than control. Furthermore, HVP treatment is found to decrease bacteria number in nutrient solutions.

I. INTRODUCTION

Northern Thailand belongs to the tropical and subtropical climates. This enables Thailand appropriate for rapid growth and development of many crops, as well as many kinds of microorganism such as pathogens. But, crop farming in fields has many problems such as insects, pathogens, flooding and water deficit. HVP and MNBs, new technology in Thailand, are both very useful for crop production that can improve germination of plant seeds, accelerate growth rate of the crop, control pests and pathogens. This study shows the effects of HVP and MNBs on seed germination, plant growth and bacteria number in solutions.

II. METHOD AND RESULTS

The 1st experiments consisted of 800 Chinese kales and were compared with 0, 1, 3 and 5 minute of MNBs water injection, and also 2,000 sweet corn seeds have been treated, individually, by MNBs, HVP and HVP+MNBs.

The 2nd experiments to study on Chinese morning glory were treated by HVP. The treatments compound of, 1) 50% nutrient solution (NS), 2)100% NS, 3) 50% NS+5 minute HVP, 4) 100%NS+5 minute HVP, 5) 50% NS+10 minute HVP and 6) 100% NS+10 minute HVP.

The results revealed that 5 minute MNBs treatment has seed germination efficiency higher than other treatments on 4 and 5 days after treatments in Chinese kale seeds. Besides, the HVP, MNBs and HVP+MNBs induce positive seed germination efficiency in sweet corns (Fig.1). The 2nd experiments found that HVP enhances leaf chlorophyll content and decreases bacteria colony number in nutrient solution (Fig.2).

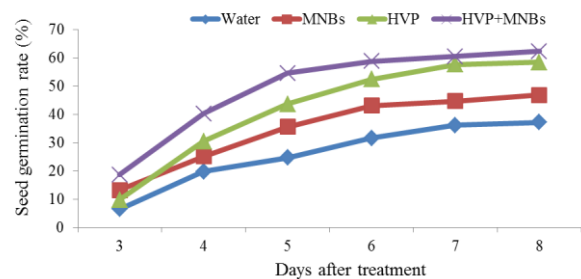


Fig. 1. Seed germination of sweet corn after MNBs and HVP treatments.

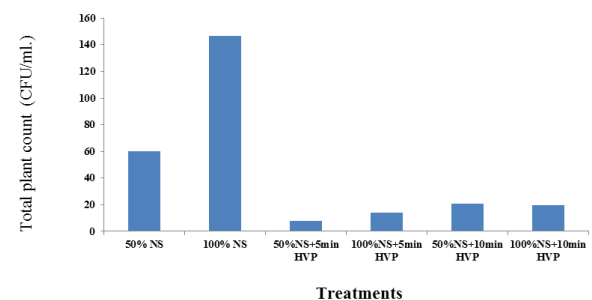


Fig. 2. Effects of HVP and MNBs on number of bacteria (Colony forming unit; CFU) in nutrient solution after treatment.

III. CONCLUSION

This experimental study has shown that HVP and MNBs can enhance seed germination efficiency in Chinese kales and sweet corns. Moreover, the bacteria number is found to decrease also.

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