# Physiological performance of healthy and virus infected orchid hybrids inoculated with mycorrhiza

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## Introduction

Almost all viral diseases cause some degree of reduction both in total yield and also survival period of the virus-infected plants. Infection of plants by virus is known to alter one or more of the processes controlling photosynthesis. The reduction in photosynthetic activity during the course of viral disease development represents one of the most detrimental stages in the diseased plants. At earlier stages of mycorrhizal inoculation, mycorrhizal orchids were found to be more susceptible to viral infections. Further mycorrhizal association do not lead to the development of disease symptoms but results in some physiological changes in the host tissues, thus increasing plant vigor and survival. Such physiological enhancement has the potential of increasing the capacity of the orchids to resist disease.

## Materials and Methods

Both healthy and virus infected Dendrobium orchids seedlings were treated with mycorrhiza. Photosynthetic light response curve was established. Other parameters measured include internal $CO_2$ concentration, water use efficiency and stomatal conductance

## Results and Discussion

The photosynthetic rate was expected to show minimal changes in response to viral infection. However the results obtained showed fluctuations in the light response curve. The photosynthetic rate was seen to increase proportionally to light intensity and $CO_2$ concentration as the control plants. The increase proceeded until a saturation point was reached, where the rates became independent. At low intracellular $CO_2$ concentrations, photosynthetic rates of healthy mycorrhizal plants increased gradually, followed by a reduction in rate at high $CO_2$ concentration. The rates for control plants and mycorrhizal and virus infected plants decreased at higher $CO_2$ concentrations. Since fluctuations occurred in the photosynthetic rate and in intracellular $CO_2$ it is assumed that the CAM processes, namely fixation of $CO_2$ into malic acid as well decarboxylation, took place during the dark and light periods, respectively. In line with $CO_2$ exchange, transpiration rates determined water use efficiency. Transpiration is influenced greatly by air temperature, humidity as well as light intensity and stomatal conductance of the leaves. At smaller stomatal conductance, water use efficiency was larger in virus-infected and mycorrizal plants. At high stomatal conductance, the stomata no longer control photosynthesis, since further increase in light intensities did not affect photosynthesis. Hence total water loss was small in infected , mycorrizal plants. The performance of mycorrhizal and virus-infected plants was lower but almost similar to that of the controls. In contrast the mycorrhizal and healthy plants showed better growth performance.

## Conclusions

It can be concluded that the survival and physiological performance of infected plants could be greatly improved through mycorrhizal symbiosis

## Benefits from the study

Use of mycorrhiza as biofertilizer in orchid growing.

## Patent(s), if applicable :

Nil

## Stage of Commercialization, if applicable:

Nil

## Project Publications in Refereed Journals

1. Tuan Ibrahim, S.Z., A.M. Abdullah, A. Hashim and N. Abdul-Samad. 2000. Physiological performance of healthy and virus-infected orchid hybrid inoculated with mycorrhiza. Trans. Malaysian Soc. Plant Physiol. 9, 221-224.

**Project Publications in Conference Proceedings:**
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