Improvement of soilless media by incorporation of *Trichoderma* inoculant for the production of cauliflower

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Introduction

Cauliflower (*Brassicae oleraceae var botrytis)* is one of the popular cruciferous vegetables in Malaysia and commonly confined to the highlands. Due to the rapid development towards industrialization, housing, and other recreational activities, cauliflower is grown in the lowlands, near to highly populated areas. Research has been carried out to produce this vegetable crop in the lowlands with the adoption of the protected environment production system using netted and rain shelters. Important factors for the success of this system is the selection of the varieties for production, and the efficient management of pests and root diseases. The movement from soil-based growing system to soilless media such as peat, saw dust or coconut mix meant that cauliflower grown under this system will have lower population of microorganisms in the rhizosphere, including those beneficial for plant growth or disease suppression. Opportunity exists, then, to introduce beneficial microbes into these substrates. The aim of this project is to improve the performance of the soilless media for the production of cauliflower by incorporation of air-dried preparation of *Trichoderma* inoculant.

Materials and Methods

An attempt was made to improve the biological properties of the soilless media by incorporation of air-dried preparation of *Trichoderma* (UPM 23). Coconut dust (CD), palm oil empty fruit bunch (EFB) and peat (P) were used singly or as mixtures; coconut dust plus peat (CDP) and palm oil empty fruit bunch plus peat (EFBP) in the ratio of 75:25 v/v. The physical (bulk density, water availability), chemical (salinity and acidity) , and microbiological properties and nutrien availability of the respective substrates were determined. The effect of the substrates on the survival and proliferation of *Trichoderma* was carried out by both augmentation and seed treatment. CD and CDP was selected as substrates to evaluate the effect of the *Trichoderma* inoculant on growth and yield of cauliflower under protected environment production system.

Results and Discussion

All substrates tested have good pore size with bulk density within the range of 1.0-1.8g/l, suitable for root growth. CD and CDP have high water availability of 15.18% and 13.99%, and EC value of 1.69 and 1.29 dS/m. pH of acid extract were around pH 5. High water retention and EC value of less than 2.0dS/m, means CD and CDP were ideal for plant growth and microbial proliferation as water and nutrients were made available readily. High organic matter further enhanced the survival and proliferation of beneficial organisms. However, since the substrates are inert agriculture by-products, they lack microorganisms for enhancement of plant growth or disease suppression. This gives opportunity to introduce or augment beneficial microorganisms to improve the performance of the substrates. CD and CDP support the proliferation and survival of the introduced *Trichoderma*. The recovery on TME medium showed a reduction of only 16% in CD and 34% in CDP on day 21 of assessment respectively. The cfu counts increased with time on the root rhizosphere, suggesting that *Trichoderma* was moving from the substrates to the growing roots. Root growth of cauliflower in CD and CDP was good, and both media were selected for further test for the production of cauliflower under protected environment production system. *Trichoderma* inoculant significantly increased seed germination and seedling emergence. 81.3% and 86% seedling emergence in *Trichoderma*- amended potting mix was recorded as compared with non-amended mixes which gave only 40 % seedling emergence 48 hours after sowing. Incorporation of *Trichoderma* inoculant gave a significant increase on stomatal conductance and net photosynthesis throughout the experiment. However, it did not have a significant effect on subsequent growth responses, nutrient uptake, peroxidase and yield responses. The negative result might be due to the levels of *Trichoderma* population which was not sufficient to give the desired effect on cauliflower due to he dilution effect. *Trichoderma* from germination mixes was diluted up to thousand times after being transferred to the soilless media packed in cultivation slabs. The recovery of UPM 23 in

the substrate, on root tips and middle segments of the roots showed that it could proliferate and survive in the soilless media and live on the cauliflower roots.

Conclusions

Protected Environment agriculture (PEA) was effective for producing good quality cauliflower with minimum pesticide usage. Problem of agriculture wastes could be solved as it could be used as cultivation substrates and was environment-friendly. Suitability of utilization could be improved by incorporation of *Trichoderma* inoculant for growth enhancement and disease suppression.

Benefits from the study

Utilization of inert materials (soilless) as culture substrates for the production of high value vegetables in protected environment system. Soilless media normally have low microbial activity for plant growth and disease suppression but good buffering capacity.

Literature cited in the text :

Nil

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Expertise Development

Name of Graduate	Degree Awarded	Field of Expertise	Graduation Year
Adeline T. S. Ying	**M Ag Sc**	**Biological Control/Plant Pathology**	**2001**
Ismail Iberahim	**M Ag Sc**	**Biological Control /Plant Pathology**	**2001**
Wong Mui Yun	**M Ag Sc**	**Biological Control/Plant Pathology**	**1999**
Hendry Joseph	**M Ag Sc**	**Biological Control/Plant Pathology**	**2000**
S.S. El-Ammari	**PhD**	**Seed Pathology/Plant Pathology**	**1996**

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