Mycorrhizal Abstracts – Effects on Root Growth

Scagel CF; Reddy K; Armstrong JM. 2003. **Mycorrhizal fungi in rooting substrate influences the quantity and quality of roots on stem cuttings of hick's yew**. HORTTECHNOLOGY. 13(1):62-66.

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In a commercial nursery propagation system for hick's yew (Taxus x media 'Hicksii'), we assessed whether or not the addition of inoculum of the vesicular-arbuscular mycorrhizal fungus (VAMF) ***Glomus intraradices*** into the rooting substrate during cutting propagation increased rooting, and how the quantity of inoculum influenced rooting. At 15 and 22 weeks (108 and 156 d) after cuttings were treated with root hormones and stuck, root initiation was higher on cuttings stuck in the rooting substrate containing VAMF inoculum. Increasing the quantity of inoculum in the rooting substrate increased root growth during the early stages of rooting. **For hick's yew, 1:100 or 2:100 (by volume) rates of G. intraradices in the rooting substrate increased the number of primary roots and growth of adventitious roots on cuttings above that achieved by using rooting hormone alone.**

BRUCE A; SMITH SE; TESTER M. 1994 **THE DEVELOPMENT OF MYCORRHIZAL INFECTION IN CUCUMBER - EFFECTS OF P-SUPPLY ON ROOT-GROWTH, FORMATION OF ENTRY POINTS AND GROWTH OF INFECTION UNITS**. NEW PHYTOLOGIST 127: 507-514.

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This paper describes an experiment in which the effects of soil phosphorus (P) on root growth and mycorrhizal colonization of Cucumis sativus L. were studied. The aim was to determine the relative contributions of root growth, formation of new infections and growth of infections within the root to the % colonization. Plants were harvested daily between 7 and 24 d. Added P had no effect on root or shoot f. wt or on root length up to 14 d. After that time plants given additional P grew well, but those with no added P grew poorly and showed signs of P deficiency. Increase in root length with added P was due both to an increase in the number of root apices produced per unit length of root per unit time and to an increase in the mean rate of extension of those apices. Effects of P on the % colonization of the roots by the mycorrhizal fungus ***Glomus intraradices*** Schenk and Smith were apparent before any effects on root length were observed. The length of

the lag phase was not affected by addition of P. The rate of formation of new entry points was similar with and without added P up to 15 d, and reduction in % colonization up to this time could be attributed entirely to reduction in the rate of growth of infection units within the roots. Later, there was a marked increase in the rate of formation of (secondary) entry points in the absence of added P, which was not observed when P was added. At 15, 20 and 25 d, additional plants were harvested to quantify the development of arbuscules and vesicles in colonized regions of the roots. At all three times, numbers of arbuscules and vesicles were lower with added P. We conclude that at very early stages of colonization P exerts its effect via reduced growth of infection units. After approx. 2 wk, an increase in the rate of growth in length of roots corresponds to the level of mycorrhizal colonization.

Berta, G; Sampo, S; Gamalero, E; Massa, N; Lemanceau, P. 2005. **Suppression of Rhizoctonia root-rot of tomato by Glomus mossae BEG12 and Pseudomonas fluorescens A6RI is associated with their effect on the pathogen growth and on the root morphogenesis**. EUROPEAN JOURNAL OF PLANT PATHOLOGY. 111(3):279-288.

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Rhizoctonia solani root-rot is a major soil borne disease causing growth and yield depression. The ability of Glomus mosseae BEG12 and Pseudomonas fluorescens A6RI to suppress this soil borne disease in tomato was assessed by comparing the shoot and root growth of plants infested with R. solani 1556 when protected or not by these beneficial strains. The epiphytic and parasitic growth of the pathogenic R. solani 1556 was compared in the presence and absence of the biocontrol agents by microscopical observations allowing the quantification of roots with hyphae appressed to epidermal cells (epiphytic growth) and of roots with intraradical infection (parasitic growth). The root architecture of the tomato plants under the different experimental conditions was further characterized by measuring total root length, mean root diameter, number of root tips and by calculating degree of root branching. G. mosseae BEG12 and P. fluorescens A6RI fully overcame the root and plant growth depression caused by R. solani 1556. This disease suppression was associated with a significant decrease of the epiphytic and parasitic growth of the pathogen together with an increase of root length and of the number of root tips of inoculated tomato plants. The combined effects of G. mosseae BEG 12 and P. fluorescens A6RI on pathogen growth and on root morphogenesis are suggested to be involved in the efficient disease suppression.

Hogberg, P; Wester, J. 1998. **Root biomass and symbioses in Acacia mangium replacing tropical forest after logging**. For Ecol Manage. 102(2-3):333-338

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Fine root biomass, A-mycorrhizal infection and root nodulation was studied in two watersheds planted with Acacia mangium, where one of the watersheds (W5) had been subject to tractor

logging and burning of residues after clearfelling, while the other (W4) had been subject to manual hauling of timber and no burning. The latter treatment had proved more successful; growth of A. mangium was twice as high, while nutrient losses were reduced by 50%. In our study we could directly attribute these differences to variations in fine root biomass and occurrence of root symbioses. However, on tractor tracks, which covered 24% of W5, fine root biomass was reduced by 75%, and mycorrhizal infection and root nodulation were reduced as well (as compared to elsewhere inW5). **These negative aspects should be taken into account when logging operations are planned, in particular since effects of tractor tracks can persist for many years. (C) 1998 Elsevier Science B.V.**

LANSAC AR; MARIN A; ROLDAN A. 1995. **MYCORRHIZAL COLONIZATION AND DROUGHT INTERACTIONS OF MEDITERRANEAN SHRUBS UNDER GREENHOUSE CONDITIONS**. ARID SOIL RESEARCH AND REHABILITATION 9: 167-175.

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Juvenile plants of Thymus mastichina, Thymus zygis, Lavandula pedunculata, Genista hirsuta, and Cistus ladanifer were transplanted from the field to the greenhouse; the soil used was the same in which they had grown at their natural site. The plants were grown to maturity to determine comparative growth, water status, and mycorrhizal colonization under greenhouse conditions and to determine the influence of drought on the symbiosis. After 24 months, L. pedunculata showed the most developed root system; G. hirsuta showed the lowest root/shoot ratio and the lowest percentage of mycorrhizal colonization. This percentage ranged from 32.0% to 82.4% for G. hirsuta and L. pedunculata, respectively. There was a positive relationship, between root biomass and root/shoot ratio with mycorrhization percentage, and a positive response of water potential to that percentage also occurred. **After a moderate drought treatment over 4 weeks, increased mycorrhizal colonization percent and root biomass was related to with decreased plant moisture stress.** The ectomycorrhizal symbiosis between C. ladanifer and Laccaria laccata appeared to be more severely affected by hydric stress than the endomycorrhizal symbiosis of the rest of the shrubs. This should be considered when this symbiosis is to be established in Mediterranean regions.
