



The University of Melbourne

IN REPLY PLEASE

QUOTE

Carlton December 5th 1926

POSTAL DISTRICT 38

Dear Mr. Shedden,

First of all I must apologise for the length of time I have taken in replying to your letter. It arrived while I was in Tasmania & on my return I had to attend to some material which I brought back with me, so that I have not had any free time until recently. I am, indeed, interested in your work for I have been keenly interested in mycorrhiza for some time. Unfortunately my work has dealt only with endotrophic forms and I have had no first hand experience with the ectotrophic types, however, the two problems are closely interlaced and perhaps I may be able to help you a little. The literature on mycorrhiza is very ample and scattered but at the present time there is a monograph on the subject by J. M. C. Rayner appearing in the New Phytologist. It is being continued through a series of numbers and later will be purchasable as one of their reprints. I do not know whether any of the scientific institutions in V.A. takes this periodical the correct reference is Mycorrhiza by M. C. Rayner New Phytologist vol XXV no 1 March 1926.



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It is an admirable survey of the subject. As to the question "What plant foods are made available by the fungus when in symbiotic relationship with the plant?" much might be said. It is at present a vexed question and as you know many are the theories that have been propounded in this connection, perhaps out of this labyrinth the idea that nitrogen metabolism is aided by the association, has been most stressed. Rayner inclines to this view, largely because the fungus isolated from the common ling (Calluna vulgaris) has been identified as a Thoma and members of this genus have been proved to be capable of fixing free atmospheric nitrogen, by analogy it is deduced that the Thoma from Calluna also possesses this characteristic. In addition, seeds germinated under aseptic conditions on a N_2 -free substrate without the mycorrhizal fungus fail to develop, while those germinated on a similar substrate with the fungus produce healthy seedlings.

To my mind this is no proof for there may be sufficient nitrogenous material in the seed to ensure



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suitable germination on a N_2 -free substrate and failure in the absence of the fungus is not conclusive proof that it is associated with nitrogen exchange for the metabolism of the plant might be disturbed in many possible directions.

From a cytological examination of an endotrophic *Mycorrhiza* fungus in *Lolium temulentum* I incline to a different view. The nutritive exchange is there a carbonaceous one, fat or oil passing from the fungus to the higher plant. This idea gains support also from Kundow's work on the germination of Orchid seeds. Many such seeds fail to germinate under sterile conditions, but if in the culture flasks sugar is placed, 100% germination can be obtained, pointing to the fact that this carbonaceous material is supplying the want of the fungus, and so enables it to live more or less saprophytically until well advanced and able to support itself. Personally I have little doubt that the failure encountered in new nurseries with pine seedlings is associated with the mycorrhizal problem and if you have been successful in isolating the mycorrhizal form, then

You might have
on loan from the
University Library here
Yours sincerely,
Ethel M. Newman.



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establishing it in the soil should give good results.

As you suggest in your paper little is known of the systematic position of endotrophic forms. They are difficult - perhaps impossible - to grow in artificial culture away from their host, and so identification is extraordinarily difficult. More has been done in this direction with ectotrophic forms, and many of the higher Basidiomycetes are recorded as fungal symbionts; in this connection & altogether from your point of view do you know a paper by Mc Donnell W. B. "On the Mycorrhiza of Forest Trees"

Amer. Journ. of Botany vol 1 1917.

I do not know of any record of a mycorrhiza on Eucalyptus, but would not be surprised if such occurred. Nearly every member of our Victorian bush flora that I have examined shows a mycorrhizal association; it is a wonderfully widespread phenomenon and its significance has not yet been realised by many botanical workers. I do not know if these few suggestions will be of use to you but I shall be very pleased at any time to hear from you and answer any queries if it is in my power. If you cannot get any references in W. A. perhaps some arrangement might be made with Prof. Ewart, so that