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INFLUENCE OF SOIL MOISTURE ON ECTOMYCORRHIZAL FORMATION OF *PRUNUS CERASOIDES* BUCH. - HAM. EX D. DON

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ABSTRACT: The current study deals with the effect of soil moisture in ectomycorrhizal formation in the seedlings of *Prunus cerasoides* Buch. -Ham. Ex D.Don. inoculated with two native ectomycorrhizal fungi viz., *Tricholoma imbricatum* and *Cantharellus cibarius*, some seedlings were maintained as control. Soil samples were collected during different season. The study highlights the importance of soil moisture for optimum ectomycorrhizal formation which appears to have a positive impact on the increased growth of the seedlings. The study observes a significant improvement and increased in the growth of *Prunus cerasoides* seedlings between the mycorrhizal and non-mycorrhizal seedlings.

KEYWORDS: *Cantharellus cibarius*, growth parameters, soil moisture, *Tricholoma imbricatum*.

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1.INTRODUCTION

Mycorrhizal fungi are naturally occurring beneficial fungi that forms a symbiotic relationship with the plant. Mycorrhizal symbiosis is mostly used in reforestation programs to improve nutrition, growth and adaptation of plants in the soil. Ectomycorrhizal (ECM) symbiosis benefits forest trees in a number of ways in terms of uptake of water, enhancing soil nutrient mobilization and is an important contributor to the survival of seedlings in the forest production. The importance of ectomycorrhizal colonization to ecosystem processes has been well documented and artificial inoculation of ectomycorrhiza has been used in nursery seedlings. Most of the terrestrial ecosystems are dominated by plants that require association with the ectomycorrhizal fungi to achieve optimum

productivity. Ectomycorrhiza are structurally modified rootlets surrounded by mycobionts and the extramatrical hyphae and function as a link between the root system and soil. Ectomycorrhizal mycelia mainly function as primary organs for absorption of nutrients in many host plants [13].The study is an attempt to investigate the role of soil moisture in the formation of ectomycorrhiza to the roots of the seedlings and the growth performance of *Prunus cerasoides* inoculated with two native ectomycorrhizal fungi.

2. MATERIALS AND METHODS

The study was conducted in the field located at Nagaland University, Lumami under Zunheboto district, Nagaland, India. The seedlings of *Prunus cerasoides* were planted in experimental plot under field condition. Seedlings were planted at 1 meter equal distance apart and were allowed to establish with proper irrigation. Twenty seedlings were maintained for each different fungi and control. No fungal inoculum was added in the controlled seedlings. The fruiting bodies of the two native ectomycorrhizal fungi *Cantharellus cibarius* and *Tricholoma imbricatum* were collected from Lumami forest area and the young sporocarps were isolated for maintenance of pure culture in Modified Melin Norkan's medium (MMN) [15]. Fungal colonization after the inoculation was monitored under stereo microscope. Development of ectomycorrhiza was counted by counting dichotomy as one mycorrhiza. Percentage of mycorrhizal colonization/cm [23] was calculated as follows:

$$\text{Ectomycorrhizal colonization (\%)} = \frac{\text{Total number of dichotomous branched rootlets}}{\text{Total number of lateral rootlets}} \times 100$$

Rhizospheric soil moisture was determined by Gravimetric method [2].

3. RESULTS AND DISCUSSION

Ectomycorrhizal colonization was observed after the inoculation with *Cantharellus cibarius* and *Tricholoma imbricatum.* The percentage of ectomycorrhizal colonization was found to be higher in *P. cerasoides* inoculated with *Tricholoma imbricatum* (Fig 4). Roots of non inoculated (control) seedlings were also found to be colonized by ectomycorrhiza (Fig 4), as the experiment was performed in the field condition where air borne fungal spores may have colonized. During summer and autumn season the rhizospheric soil moisture of *Tricholoma imbricatum* inoculated seedlings was found higher, but at spring and winter season the rhizospheric soil moisture of *Cantharellus cibarius* inoculated seedlings was found higher (Fig 2). During the summer and autumn season, with high soil moisture (Fig 2) higher colonization percentage was observed but during the winter season, with low soil moisture low formation of ectomycorrhizal to the seedling roots was observed. Growth of the seedlings inoculated with the ectomycorrhizal fungi shown significant effect in all growth parameters in comparison with the control seedlings. Higher percentage of survival was observed

in the seedlings inoculated with ectomycorrhizal fungi.The symbiotic relationship between the fungal and host plant were found beneficial in the growth of the host species.

Fig 1: Ectomycorrhizal fungi (a). *Cantharellus cibarius* (Fr.) and (b). *Tricholoma imbricatum* (Fr.) P. Kumm.

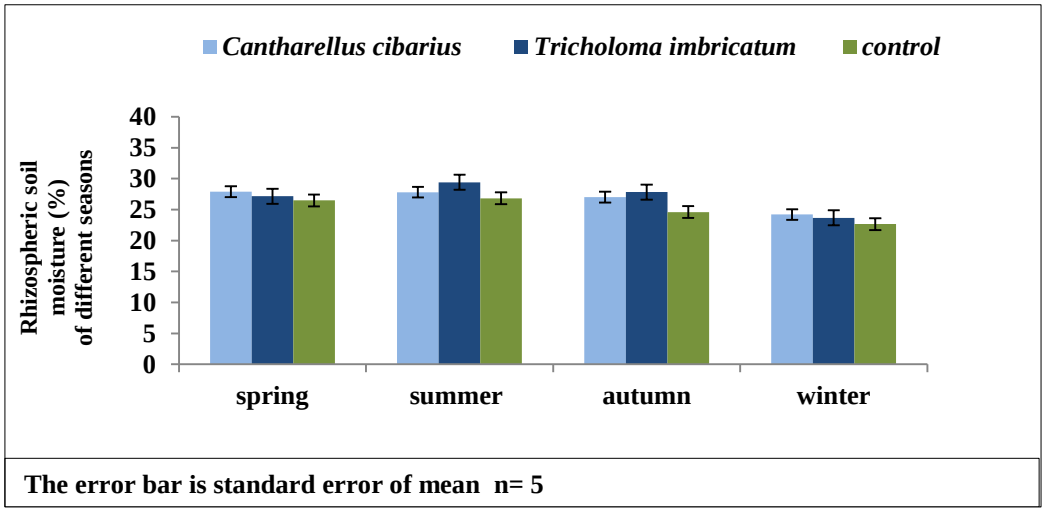

Fig 2: Rhizospheric soil moisture (%) of *P. cerasoides* in different seasons

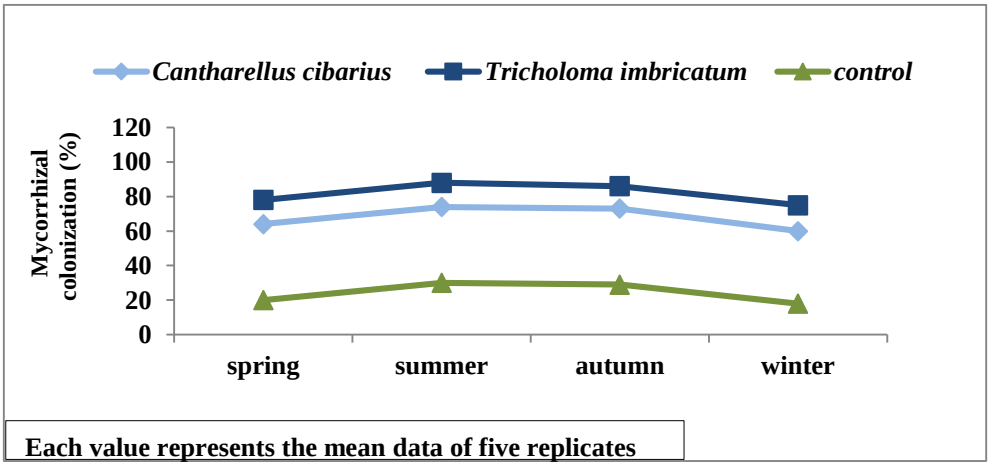

Fig 3: Percentage of ectomycorrhizal colonized roots of *P. cerasoides* in different seasons

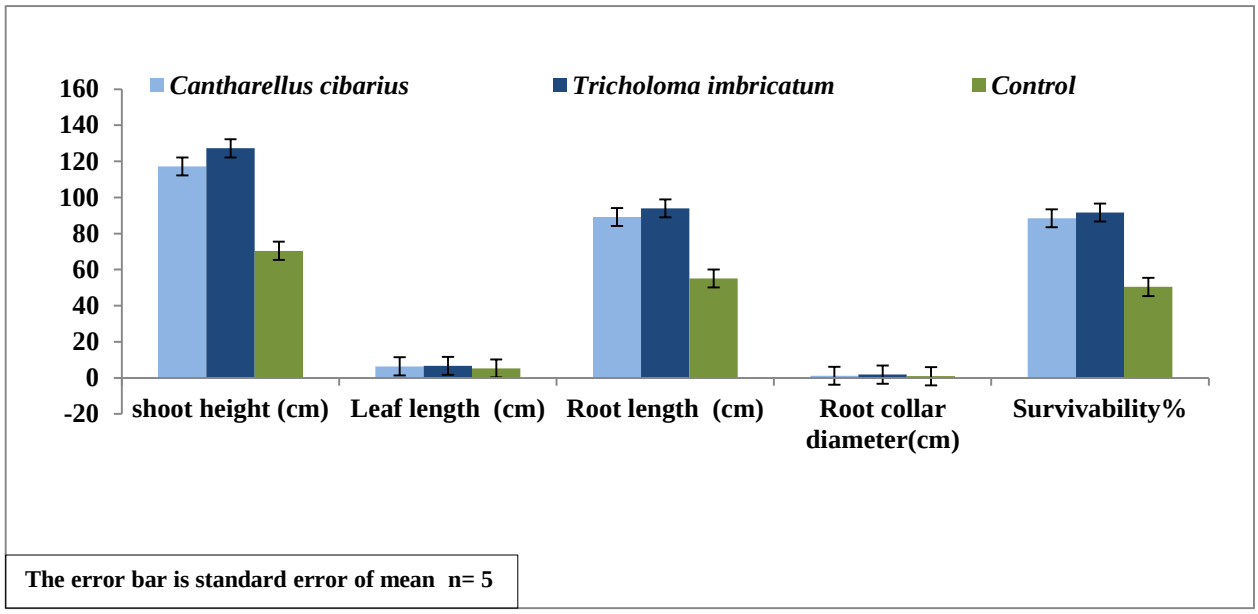

Fig 4: Growth and survivability of 1 year old *P. cerasoides* seedlings

4. CONCLUSION

A significant effect on the growth of inoculated seedlings can be attributed to increased absorptive surface area due to the extensive network of fungal mycelium resulting in increasing uptake of water and nutrients [6]. The result has demonstrated that the growth of the seedlings inoculated with the ectomycorrhizal fungi showed significant effect in all growth parameters in comparison with the control seedlings. Higher percentage of survival was observed in the seedlings inoculated with ectomycorrhizal fungi. Because of their extensive root system many tree species can survive well even in poor soil condition. In this study the symbiosis between the fungal and host plant were found beneficial in the growth of the host species. Thus, selection of suitable fungal symbiont for mycorrhizal inoculation is an important strategy. There is a need to conduct such studies under field conditions in order to prove usefulness of such technique in forest vegetation programmes.

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CONFLICT OF INTEREST

Authors declare that they have no conflict of interest.

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