ORIGINAL RESEARCH PAPER

Botany

KEY WORDS: mycorrhizal, symbiotic association, trypan blue, medicinal plant, fungal colonization

STUDY OF MYCORRHIZAL ASSOCIATION IN SOME SELECTED MEDICINAL PLANTS OF PURULIA, WEST BENGAL.

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ABSTRACT

Mycorrhizal fungi display symbiotic association with plants from ancient life. Over 90% of modern day plants show this symbiotic association. As mycorrhizal fungi have remarkable capacity in phosphate solubilization, it serves a potential partner for plants to colonize in phosphate limited soil. This study mainly focused on the recording of percentage of root colonization and diversity of mycorrhizal association in ten selected plant species of different families from medicinal plants garden of Sidho Kanho Birsha University, Purulia. Root samples of selected plants were subjected to acid maceration and followed by staining overnight with trypan blue. Seven of them have shown positive result whereas the other three have no trace of fungal colonization. Among seven mycorrhizal plants two have shown only arbuscules; four exhibited only vesicles whereas Hibiscus sabdariffa L. have shown only fungal hyphae. Our study hopefully become a starting point for VAM research in medicinal plant life. Extensive research on this field is needed for a better tomorrow.

INTRODUCTION

The observed interaction between vesicular arbuscular mycorrhizae (VAM) and host plants is important in various natural and agricultural ecosystem. This association plays an essential role in enhancing plant growth in semiarid agro ecosystems (McGee, 1989). Vesicular arbuscular mycorrhizal (VAM) fungi are most commonly arbuscular mycorrhizal fungi (AM) are ubiquitous in their distribution and occur abundantly. The presence of arbuscular mycorrhizal fungi (AFM) can be important for environmental sustainability, plant development and biodiversity care. Mycorrhizal associations occur naturally with more than 95% of terrestrial plants, of which 65% belong to arbuscular mycorrhiza. VAM fungi are responsible for the absorption of several mineral production specifically phosphate into the soil by active plants and thus increase energy (Gerdemann et al., 1963). Mycorrhiza referred as bio fertilizers and can be substantiated for the substantial amounts of chemical fertilizers. Herbal medicines are increasingly being used not only by developing countries but also by developed countries in their original health care system.

OBJECTIVES

- Assessment of colonization of roots of some medicinal plants by mycorrhizal fungi.
- Assess the impact of AFM inoculation on populations and colonization success by indigenous AFM species.
- Examine the impact of soil and climate on the persistence of introduced commercial AFM isolates.

Fig 1 :- Abrus precatorius

MATERIAL'S AND METHOD

This study mainly focused on the recording of percentage of root colonization and diversity of mycorrhizal association in ten selected plant species of different families from medicinal plants garden of Sidho Kanho Birsha University like ***Ludwigia perennis*** L.(Onagraceae), ***Solanum torvum*** Sw. (Solanaceae), ***Leonurus sibiricus*** L. (Lamiaceae), ***Hibiscus sabdariffa*** L.(Malvaceae), ***Clerodendrum indicum*** (L.) Kuntze (Lamiaceae), ***Abutilon indicum*** (L.) Sweet (Malvaceae), ***Bryophyllum pinnatum*** (Lam.) Oken (Crassulaceae), ***Abrus precatorius*** L. (Fabaceae), ***Wissadula amplissima*** (L.)R. E. Fr. (Malvaceae) and ***Hygrophila auriculata*** (Schumach.) Heine (Acanthaceae).

At first Roots were collected from soil for individual plant species. Then the roots are washed clearly with water to remove the adhering soils. Now, roots were cut at 1 cm length and again washed with tap water thoroughly then kept the root pieces on 10% KOH solution and Subjected to water bath at 90°C for 30-50 minutes. After 1 hour root samples are collected and put into HCL solution for couple of minutes. Now samples were stained with trypan blue and kept overnight. Next day root samples are washed with 50% glycerol and then observed in microscope 10 X 40 magnification.

Fig 2:- Abutilon indicum

Fig 3:- Bryophyllum pinnatum

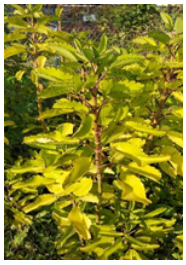


Fig 4:- Hibiscus sabdariffa

Fig 5:- Ludwigia perennis

Fig 6:- Solanum torvum

Fig 7:- Clerodendrum indicum

Fig 8:- Hygrophila auriculata

Fig 9:- Wissadula amplissima

Fig 10:- Root Samples are stained with Trypan Blue

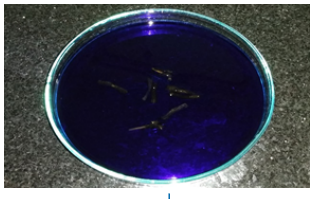


Fig 11:- Author during lab work

Fig 12:- Samples in Water Bath

Table: Percent of roots colonization

FAMILY NAME	PLANT NAME	AMF COLONIZATION %		
		HYPHAL	VESICULAR	ARBUSCULAR
Onagraceae	*Ludwigia perennis*	52.95±1.00	0.00	14.07±1.00
Solanaceae	*Solanum torvum*	80.20±1.00	13.28±1.00	0.00
Lamiaceae	*Leonurus sibiricus*	67.4±1.00	0.00	44.68±1.00
	Clerodendrum indicum	73.89±1.00	45.50±1.00	0.00
Malvaceae	*Hibiscus sabdariffa*	31.11±1.00	0.00	0.00
	Abutilon indicum	70.80±1.00	48.50±1.00	0.00
	Wissadula amplissima	0.00	0.00	0.00
Crassulaceae	*Bryophyllum pinnatum*	85.88±1.00	38.28±1.00	0.00
Fabaceae	*Abrus precatorius*	0.00	0.00	0.00
Acanthaceae	*Hygrophila auriculata*	0.00	0.00	0.00

RESULTS AND DISCUSSION

Seven out of ten plant root sample had shown positive results whereas the other three have no trace of fungal colonization. Among seven mycorrhizal plants two (***Ludwigia perennis*** and ***Leonurus sibiricus***) had shown only arbuscules; four (***Solanum torvum***, ***Clerodendrum indicum***, ***Abutilon indicum*** and ***Bryophyllum pinnatum***) exhibited only vesicular Colonization whereas ***Hibiscus sabdariffa*** had shown only hyphal colonization.

Fig 13:- Hibiscus sabdariffa

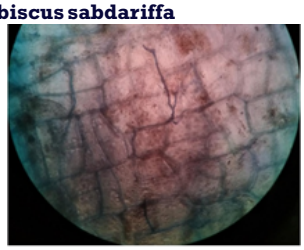


Fig 14:- Leonurus sibiricus

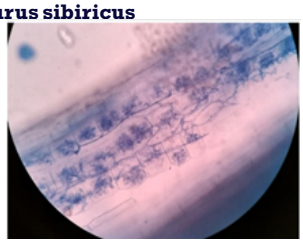


Fig 15:- Clerodendrum indicum

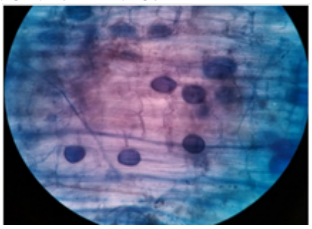


Fig 16:- Leonurus sibiricus

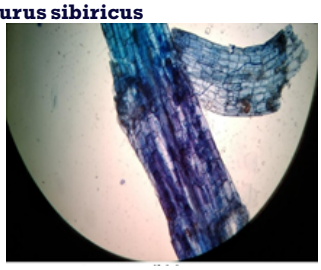


Fig 17:- Bryophyllum pinnatum

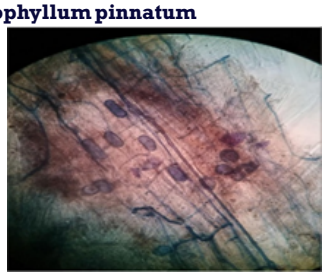
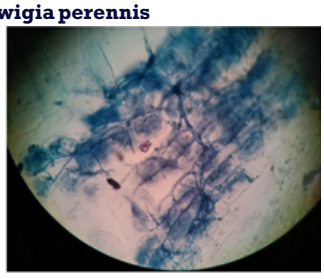
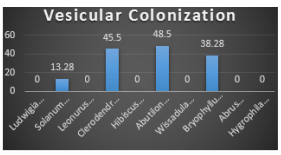
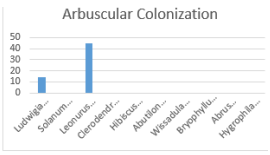
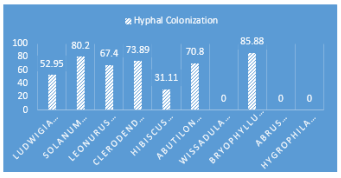


Fig 18:- Ludwigia perennis









CONCLUSION

Mycorrhizae are particularly important in assisting the host plant with the uptake of phosphorus and nitrogen, two nutrients vital to plant growth. The importance of VAM in supplemental food production is highly appreciated. In medicinal plant the mycorrhizal fungi also take a major role in plant growth. There is a steady increase in the cultivation of medicinal plants to maintain continuous distribution to support the growing demand but collaborative research of VAM fungi and their association in medicinal plants have received very little attention compared with field crops. Our study hopefully become a starting point for VAM research in medicinal plant life. Extensive research on this field is needed for a better tomorrow.

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