

## Anthill soil is a good repository of VA mycorrhizal spores in Southwest Bengal

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### Abstract

Vesicular Arbuscular (VA) mycorrhizal fungi play a crucial role in the soil of forest ecosystem which is a potent microorganism that can be used as bio-fertilizer to improve the quality and quantity of crops. It is found everywhere i.e. agriculture land, grassland, forest and in various garden soils. The spore and mycelia found in soils which are active during vegetative growth of the plants though during winter the soil contains a large number of spores compare to the other seasons in most of the places not in confined Indian soil. The colonization percentage of root of higher plants shows highest significant infection during monsoon followed by winter and summer in a same field. Details study of VAM infection in garden soil also shows the same pattern but certain circumstances they showed significant increase in number of VAM colonization during post monsoon because of artificial watering in the soil. No study of anthill soil has been taken by authors to study the VAM spores till date to access the atmosphere of environment in forest of south Bengal. Therefore, the present study is a study of anthill soil containing VAM spores in lateritic sal (*Shorea robusta*) dominated southwest Bengal which shows common anthill in the territory of Forest.

VAM is common fungi which inhibit in almost all types of flowering and non-flowering plants. Southwest Bengal forest floor is a good habitat of ants and rhizosphere soils is composed of various kinds of microorganisms including VAM fungi. Ants infect on bark of living trees in forest during winter while they make anthill during monsoon while repair the same throughout the year. Many herbaceous and shrubby plants grow on anthill but some are permanently present as tree species like *Shorea* and *Gardenia* sp. It hosts edible fungi mainly *Mycenia* and

*Lycoperdon* spp. The soil is clean in anthill and garbage free. During spore isolation from soil vivid and clear spores are required. Clear spores are used to identify and to make inocula through culture followed by mass culture. Remembering the theme and future research present investigation has been conducted in a place which contains anthill and forest soil of Gopegarh, Paschim Medinipur.

### Study Area :

The study site selected was near the

downhill side on Medinipur-Dherua metallic road. Geographically it is located in western part of the town nearly 4 kms away from the centre of the town and nearer the bank of river Kansai. It is situated nearly 3.5 kms away from Vidyasagar University, Paschim Medinipur<sup>5,9</sup>. It consists of dry deciduous vegetation covered with plantation species like *Anacardium*, *Acacia*, *Eucalyptus*, *Ailanthus*, *Cassia* etc. Other shrubby species found there are *Helicteres isora*, *Premna latifolia*, *Smilax macrophylla*, *Ichnocarpus frutescens*, *Ipomoea* spp., and *Butea superba*. Herbs found luxuriously during monsoon on lateritic bed are species like *Ilysanthes* spp., *Leucas* spp., *Paspalum* spp., *Phyllanthus* sp., *Glenus* sp., *Andrographis paniculata* etc. Most of the species found here were medicinal<sup>1</sup>. The site has natural forest, degraded land and plantation stand also. Cashew is the main cash crop of the plantation stand.

Anthill soils and forest ground soils were collected from Gopegarh during May, 2017. Twenty gram soil of each kind was taken and 3 samples for each type were taken for spore density count. Wet sieving and decanting

method was used<sup>7</sup>. Sieves used were 100, 170, 200, 300 BBS and 38  $\mu$ . Stereo microscope was used to count the microscope and canon camera was used to trap the photographs of spores. Literature used for VAMF study of this type includes references<sup>1-16</sup>.

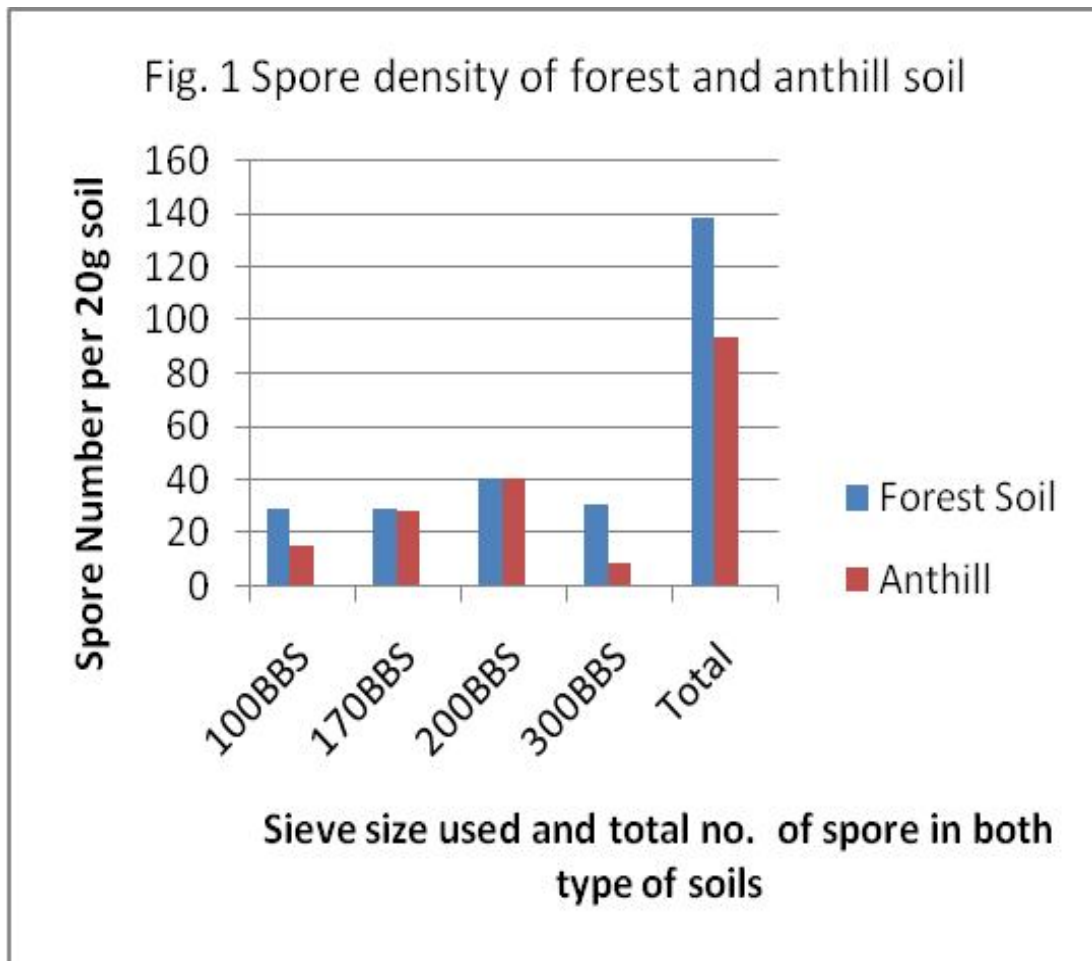
Soil of two different types showed different types of result (Table 1 and Table 2). In both the cases, 38 $\mu$  sieves did not show any VAM spore. 200BBS sieve showed in both the cases same number of spores (41 per 20g soil) and that number was highest irrespective of other sieved spores. Mean total number of spores was recorded higher in case of forest soil against anthill soil (Fig. 1). The spores from anthill soils (Fig. 3, 4 and Fig. 7) were more clear and larger than spores of forest soil (Fig. 2, 5 and Fig. 6). Under compound microscope the walls of spores from anthill were more clear and distinct than spores of forest soil. As spores are vivid and large but less in number so they are easy to be picked by dowel (wooden peg) for inoculation in sudan grass (*Sorghum bicolor*) root for inoculums production.

Table-1. Spore density in 20g forest soil in Gopegarh, Paschim Medinipur, West Bengal

Sl. No.	Number of VAM spore in 20g Forest Rhizosphere soil (Mess size in BBS and $\mu$ )					Total
	100BBS	170BBS	200BBS	300BBS	38 $\mu$	
1.	25	45	52	29	0	151
2.	26	12	27	17	0	82
3.	37	31	45	71	0	183
Total	88	88	123	117	0	416
Mean	29.3	29.3	41	39	0	138.66

Table 2. Spore density in 20g Anthill soil in Gopegarh, Paschim Medinipur, West Bengal

Sl. No.	Number of VAM spore in 20g Anthill soil (Mess size in BBS and $\mu$ )					Total
	100BBS	170BBS	200BBS	300BBS	38 $\mu$	
1.	23	21	32	12	0	88
2.	4	32	44	5	0	85
3.	19	33	47	9	0	108
Total	46	86	123	26	0	281
Mean	15.3	28.66	41	8.66	0	94



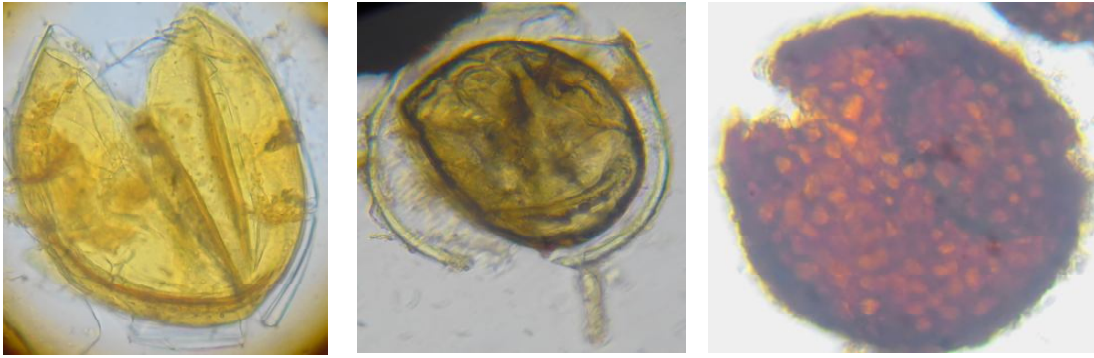


Fig. 3; Fig. 4 and Fig. 7 are VAM spores from anthill

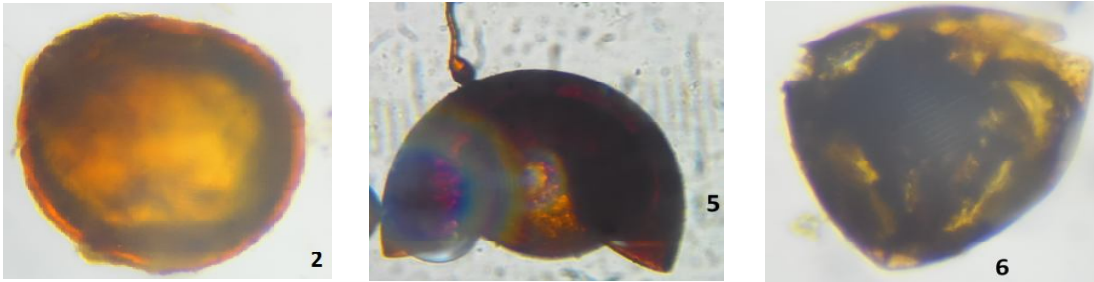


Fig. 2; Fig. 5 and Fig. 6 are VAM spores from forest soil

Anthill is a good repository of VAM spores in our study area according to the present report. It indicates that the spores in anthill are very clear to see even to isolate without garbage. So, anthill soil may be a potent soil to identify VAM spores and culture the spores for mass inocula production in near future. No similar kind of study has been made till date by other researchers. Therefore, intensive study including seasonal variations of spore density in anthill soils of various regions may be included in VAM research soon.

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#### References

16. Hamel, C and C. Plenchette (2007). Mycorrhizae in Crop Production, Haworth Food & Agricultural Products Press, Binghamton, NY, pp. 319.

2. Das, D. (2007). Studies of Vegetation Ecology of forest of Southwest Bengal with special reference to Non Timber Forest Produce (NTFP) productivity, Ph. D. Thesis (Awarded), Vidyasagar University, Midnapore, West Bengal.
3. Das, D. (2015). *IOSR-JESTFT*, 9 (11): 61-71.
4. Das, D. (2017). *Quest Journals, Journal of Research in Agriculture and Animal Science*, 4(11): 01-07.
5. Das, D. and P. Ghosh (2006). *Mahishadal Journal of Biology*, 1: 30-33.
9. Ghosh, P. (2017). Vesicular-arbuscular Mycorrhizal studies of selected Medicinal Plants of Southwest Bengal and its impact on yield, Ph. D. Thesis, Awarded from Vidyasagar University, Midnapore, W.B.
15. Ghosh, P. and N.K. Verma (2017). *IJSART* 3(9): 660-665.
11. Ghosh, P and D. Das (2017). *IJSART*, 3(5): 140-146.
12. Ghosh, P and D. Das (2017). VAMF spore diversity of Jhitka Forest floor under proposed Jhargram District in West Bengal, India, *IJSART*, 3(2): 227-232.
8. Ghosh, P. (2014). *IJIRD*, 1: 52-57.
10. Ghosh, P. and D. Das (2014). *Environment & Ecology*, 32 (2): 465-470.
13. Ghosh, P. and N. K. Verma (2015). *Int. J. Pure. App. Biosci.*, 3(6): 137-149.
14. Ghosh, P. and N.K. Verma (2016). *IJIRD*, 2: 21-26.
6. Das, D and P. Ghosh (2014). *IOSR-JESTFT*, 8 (6/V1): 48-63.
1. Anonymous, (2017). Medicinal Plants of South Bengal, Research Wing, Directorate of Forest, Govt. of West Bengal.
7. Gerdemann, J.W. and T.H. Nicolson (1963). *Trans. Br. Mycol. Soc.*, 46: 235-244.