

Abundance of Soil Acari in Natural Forest Plantation

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ABSTRACT

The investigation on abundance of soil Acari in natural forest plantation were carried out at Gandhi Krishi Vignana Kendra University of Agricultural Sciences, Bengaluru during the month of October and December of 2014 and January and October of 2015. The samples (litter and soil) were collected from *Tectona grandis*, *Terminalia arjuna*, *Albizia odoratissima*, *Artocarpus heterophyllus* using the circular core sampler measuring 12 cm diameter and 10 cm height. The quantity of litter and soil sample collected was 150 g and 400 g, respectively. The results revealed that soil Acari constitute major soil invertebrates and occupied in organic matter rich forest plantations. Slight variation in the abundance may be due to quality of the leaf litter, shade provided by the tree species, moisture content of the litter and soil and periodical accumulation of organic litter over a period of time.

SOIL arthropods are a fundamental component of forest ecosystems, since they participate in the organic matter fragmentation, previous to decomposition. Soils were among the first terrestrial environments to be colonized because they possess environmental conditions that are intermediate between aquatic and aerial media (Lavelle and Spain, 2001). Natural forests are complex and very stable ecosystems. The soil ecosystem contains often abundant groups of mesofauna, such as soil mites and other microarthropods (Coleman & Whitman 2005). Oribatid mites (Acari: Oribatida) are the numerically dominant microarthropods in forest ecosystems (Osier and Beattie, 1999; Maraun *et al.*, 2007). The investigation on abundance of soil Acari in natural forest plantation were carried out at Gandhi Krishi Vignana Kendra campus of the University of Agricultural Sciences, Bengaluru during the month of October and December of 2014 and January and October of 2015. The samples (litter and soil) were collected from *Tectona grandis*, *Terminalia arjuna*, *Albizia odoratissima*, *Artocarpus heterophyllus* using the circular core sampler measuring 12 cm diameter and 10 cm height. The quantity of litter and soil sample collected was 150 g and 400 g, respectively. The meso-fauna was extracted from the litter and soil samples using Rothamsted modified MacFadyen high gradient funnel apparatus in the soil biology laboratory. The samples were collected in vials containing 70 per cent ethyl alcohol fixed to the lower end of the funnel.

The collected samples were observed under stereo binocular microscope for further identification.

Variation in abundance of Cryptostigmatids was observed in different forest plantation during 2014 and 2015 samples (Figure 1). Maximum abundance was noticed in *T. grandis* litter (22) during 2014 samples and was on par with *A. heterophyllus* soil, *A. heterophyllus* litter and *T. arjuna*. However, maximum Cryptostigmatids abundance was documented in *A. odoratissima* litter (19.83 Cryptostigmata/150g litter) and was on par with *T. grandis* soil, *T. arjuna* soil, *A. heterophyllus* soil and *A. odoratissima* soil. On the other hand, *A.odoratissima* litter harboured significantly higher cryptostigmatids population during 2015 and was on par with *T. arjuna* litter, *T. grandis* soil and *A. heterophyllus* soil. Cryptostigmatids population was peak in the samples collected during December 2014. *T. grandis* litter recorded significantly higher cryptostigmatids compared to rest of the ecosystems. However, there was no difference in cryptostigmatid population among the ecosystems at peak activity stage.

Higher mesostigmatid population was recorded in *A. heterophyllus* soil compared to rest of the ecosystems during 2014 samples. It was more in *T. arjuna* litter during 2015 samples. However,

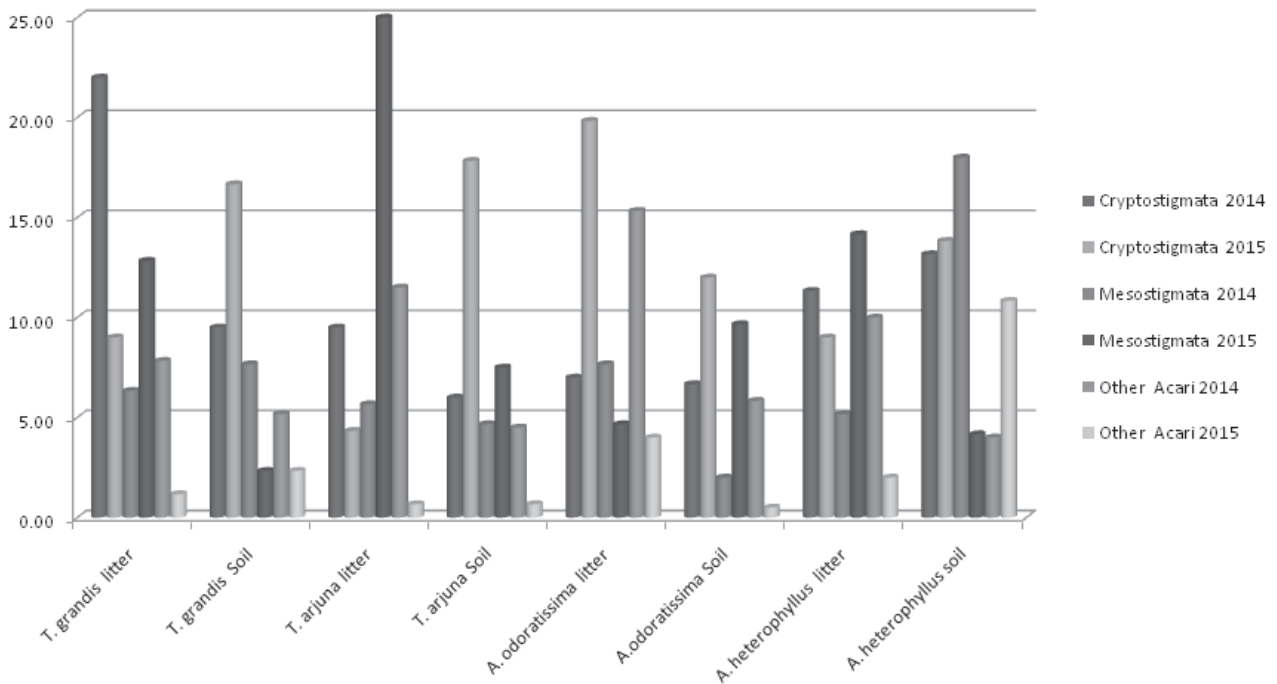


Fig. 1. Abundance of soil Acari in natural forest plantation

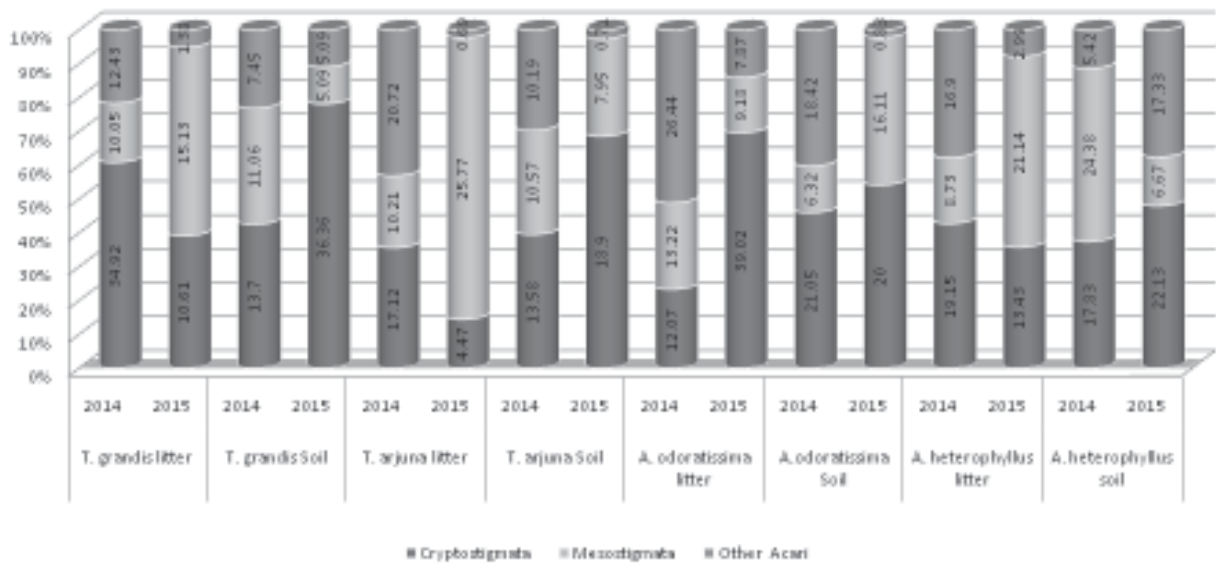


Fig.2. Relative abundance of soil Acari during 2014 - 2015

significantly higher mesostigmatid abundance was noticed in *A. heterophyllus* soil and *T. grandis* litter during 2014 and 2015, respectively.

Population of other Acari was less compared to Cryptostigmatids and mesostigmatids in both years. Maximum acari were observed in *A. odoratissima*

litter (15.33) and *A. heterophyllus* soil (10.83), during 2014 and 2015 respectively.

Relative abundance of soil cryptostigmatids varied among the treatments in natural forest in 2014 (Figure 2). Cryptostigmatid abundance was high in *T. grandis* litter (34.92 %) and lowest in *A. odoratissima* litter (12.07%).

Higher relative abundance of mesostigmatids was documented in *A. heterophyllus* soil (24.38%) and lowest in *A. odoratissima* soil (6.32%). Maximum relative abundance of other Acari was recorded in *A. odoratissima* litter (26.44%) and least abundance was observed in *A. heterophyllus* soil (5.42%). However, maximum relative abundance of cryptostigmatids was high in *A. odoratissima* litter (39.02 %) during 2015. Lowest cryptostigmatids population was noticed in *T. arjuna* (4.47%). *T. arjuna* litter (25.77%) and *T. grandis* soil (5.09%) documented maximum and minimum relative abundance mesostimatids, respectively during 2015.

The relative abundance of other Acari was higher in *A. heterophyllus* soil (12.33%) and *T. arjuna* litter (0.69%).

The present observation on soil and litter acari are in corroborate with the observation of Coleman and Whiteman (2005), Osier and Beattie (1999) and Maraun *et al.* (2007).

The finding of this study suggest that soil acari constitute major soil invertebrates and occupy in organic matter rich forest plantations. Slight variation in the abundance may be due to quality of the leaf litter, shade provided by the tree species, moisture content of the litter and soil and periodical accumulation of organic litter over a period of time.

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