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Comparative evaluation of population dynamics of *Tyrophagus putrescentiae* Schrank (Acari: Acaridae) on fruiting body of *Pleurotus sajor caju* at different composition

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Abstract
T. putrescentiae population on fruiting body arises from wheat straw based compost revealed that mite number decreased significantly at 36th day. No mites were recorded after 36 days on fruiting body at level of 10, 20 and 30 *T. putrescentiae* pairs. Similarly, on wheat straw plus calcium sulphate based fruiting body, no mites were recorded after 24, 30 and 36 days. Observations on the average population of *T. putrescentiae* on fruiting bodies raised from wheat straw based compost revealed that mite number increased significantly at each observation period till 10 days (41.66, 59.00, 83.00 mites/10g) was recorded at level of 10, 20 and 30 *T. putrescentiae* pairs. Likewise, observations on the population of *T. putrescentiae* on fruiting bodies raised from wheat straw plus calcium sulphate based compost recorded a peak in population (45.00, 51.00, 84.00 mites/10g) was recorded at level of 10, 20 and 30 *T. putrescentiae* pairs.

Keywords: Compost, fruiting body, oyster mushroom, *Tyrophagus putrescentiae*

1. Introduction
Tyrophagus putrescentiae (Schrank) (Astigmata: Acaridae) is a cosmopolitan mite found in the cereals, mushrooms, stored foods and home dust, nests of birds and bees, feeding on different developmental stages of insects, including eggs [1]. There are several types of mites associated with cultivated mushrooms. The seasonal production of tropical and subtropical species of oyster mushroom in different parts of the country is 15-20,000 tonnes/annum [2]. Haryana is the leading state in seasonal mushroom production contributing approximately 4000 tonnes per year [3]. Reports are also available on the occurrence of mites including *Tyrophagus putrescentiae* in oyster mushrooms [4]. The level of damage caused by mites is related to the size of the population, which in turn depends on how rapidly the population is able to increase in number [5]. Mycelium-eating mites can cause high yield losses [6]. Mites are reported from mushroom beds throughout the season. The presence of mites from September to March on temperate mushroom whereas mites in mushroom compost from April to June. Latter also observed the comparable number of Cryptostigmatid and Asitgmatid mites in compost [7]. The optimum temperature for the development and reproduction of *T. putrescentiae* and *Aleuroglyphus ovatus* is 25 ^{0}C [8]. Low and high temperatures had negative effects on all immature stages and on the life cycle of both *T. putrescentiae* and *A. ovatus*. At favourable temperatures and 90 to 100 percent relative humidity, the *T. putrescentiae* female can lay an average of 437 eggs [9]. This paper describes a laboratory study to examine Feeding potential relationships between *Pleurotus sajor caju* fruiting bodies against *T. putrescentiae* adults at different composition.

2. Material and Methods
2.1 Collection and Test Material
Stock culture of *T. putrescentiae* was maintained in laboratory at 27±1 ^{0}C and 80-85 percent relative humidity in Department of Zoology, and compost/fruiting body of *Pleurotus sajor caju* was obtained from Department of Plant Pathology, CCS Haryana Agricultural University, Hisar

2.2 Experimental Set up

In the experiment there were three treatment groups. These consist of 10, 20 and 30 pair of *T. putrescentiae.* Each treatment contained sets of different duration *viz*., 0, 6, 12, 18, 24, 30 and 36 days. The experiment on fruiting body of *Pleurotus sajor caju* during cultivation season of 2015 was conducted to see the population buildup of *T. putrescentiae* on fruiting bodies raised on two different composts procured from Hisar (wheat straw) and Sonipat (wheat straw + $CaSO_4$) region, respectively. The fruiting bodies were divided into three treatment groups within a complete randomized block design consisting of three sets and three replicate per set. Treatment one consists of fruiting bodies in which 10 *T. putrescentiae* pairs were released. Treatment second and third contained 20 and 30 *T. putrescentiae* pairs per replicate as initial inoculums. The density of *T. putrescentiae* in each replicate was monitored under sterozoom microscope. At each observation period, mixed population of *T. putrescentiae* was counted and recorded.

2.3 Statistical analysis

The reported data are the mean of triplicates and was subjected to ANOVA to analyze the significant differences using software 'OPSTAT', developed at the Computer Center, College of Basic Sciences and Humanities, CCS Haryana Agricultural University, Hisar.

3. Results and Discussion

During Experiment petri plates filled with water due to release of moisture content of fruiting body was observed and due to this difficulties in counting of population of *T. putrescentiae.* The population of mites (39.40 mites/10g fruiting body) were recorded from 30 *T. putrescentiae* pairs of initial inoculums than 20 pairs of initial inoculums (26.80 mites/ 10 g fruiting body) and 10 pairs initial inoculums (16.0 mites/ 10 g fruiting body) (CD=0.07; p= 0.05). Irrespective of initial infestation level, maximum number of mites was witnessed at 0 day which showed significant difference in the mite numbers at other observation periods (CD= 0.02; p= 0.05).

Table 1: Relative incidence of *Tyrophagus putrescentiae* on fruiting body raised from wheat straw compost

Observation Period (days)	Average number of mites/10 g of fruiting body			Mean
	10 pairs	20 pairs	30 pairs	
0	20.00 (4.58)	40.00(6.40)	60.00(7.81)	40.00(6.26)
6	31.00(5.65)	53.30(7.37)	71.60(8.52)	51.90(7.18)
12	40.00(6.40)	65.30(8.14)	88.60(9.46)	64.60(8.00)
18	19.30(4.50)	21.30(4.72)	41.60(6.53)	27.40(5.25)
24	2.00 (1.71)	7.00(2.81)	11.30(3.50)	6.76(2.68)
30	0.33(1.13)	1.00(1.38)	3.33(2.07)	1.55(1.53)
36	0.00(1.00)	0.00(1.00)	1.00(1.00)	1.00(1.00)
Mean	16.0(3.57)	26.8(4.54)	39.6(5.56)	

Figure in parenthesis are √n+1 transformation

The number of mites increased significantly after 6th and 12th day, thereafter, decrease significantly to 27.4, 6.76 and 1.55 mites/10g fruiting body at 18, 24, 30 and 36th day. Interaction between initial infestation level and observation period was also significant (CD= 0.20; p= 0.05) (Table 1)

Table 2: Relative incidence of *Tyrophagus putrescentiae* on fruiting body raised from wheat straw+ $CaSO_4$ based compost

Observation Period	Average number of mites/10 g of fruiting body			Mean
	10 pairs	20 pairs	30 pairs	
0	20.0(4.58)	40.0(6.40)	60.0(7.81)	40.0(6.25)
6	31.0(5.65)	48.0(7.00)	69.0(8.36)	49.3(7.00)
12	35.6(6.05)	51.0(7.21)	74.0(8.66)	53.5(7.30)
18	10.0(3.31)	21.3(4.72)	38.6(6.29)	23.3(4.77)
24	0.00(1.00)	0.00(1.00)	0.00(1.00)	0.00(1.00)
30	0.00(1.00)	0.00(1.00)	0.00(1.00)	0.00(1.00)
36	0.00(1.00)	0.00(1.00)	0.00(1.00)	0.00(1.00)
Mean	13.8(3.23)	22.9(4.04)	34.5(4.87)	

Figure in parenthesis are √n+1 Transformation

In Table 2 Irrespective of initial infestation level, maximum number of mites was witnessed at 12th day (53.5 mites) which showed significant difference in the mite numbers at other observation periods (CD= 0.15; p= 0.05). The number of mites decreased significantly to 23.3, 4.11 and 0.22 at 18, 24, 30 and 36 day. Interaction between initial infestation level and observation period was also significant (CD= 0.26; p= 0.05) (Table 4) which indicated that weekly observations on number of mites recorded at higher infestation level was more and differed significantly with other infestation levels. Similar trend was earlier visible in pulses and wheat. Calcium sulphate decreases the pH of compost. which may proved helpful for mite survival during the present study [10]. She further reported that significantly higher *T. putrescentiae* population developed on wheat straw + poultry manure based compost (46.46 mites) followed by wheat straw + wheat bran based compost (44.20 mites), wheat straw + cotton seed meal (40.39 mites), paddy straw based compost (38.20 mites) and wheat straw + paddy straw based compost (36.93 mites). Least numbers of mites were recorded on oat flakes and grains after 15 days of initial inoculation [11]. *T. putrescentiae* was predominant in stored grains and mushrooms as pests and in soil as predators of plant parasitic nematodes[12].

4. Conclusion

Observations on the average population of *T. putrescentiae* on fruiting bodies raised from wheat straw plus calcium sulphate based compost recorded a peak in population (45.00, 51.00, 84.00 mites/10g fruiting body) was recorded at initial

inoculums level of 10, 20 and 30 *T. putrescentiae* pairs but population decline completely at 24 days as compared to wheat straw based compost in which population continuous till the 36 days. So, calcium sulphate help to maintain the pH of compost and control the population of *T. putrescentiae* at a certain level.

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6. References

1. Ania DA, Oloke JK, Jonathan SG, Olawuyi, OJ. Comparative assessment of mycelia biomass and exo polysaccharide production in wild type and mutant strains of *Scizophyllum commune* grown in Submerged liquid medium. Natural Sciences. 2012; 10:82-89.
2. Verma RN. Indian mushroom industry – past and present. Bulletin 8 of World Society for Mushroom Biology and Mushroom Products. 2013, 16.
3. Singh M. Mushroom Production: An Agribusiness Activity. In: Mushroom-Cultivation, marketing and consumption, Directorate of Mushroom Research, ICAR, Solan (H.P.), 2011, 1-10.
4. Thapa CD, Seth PK. Mushroom mites and their control. Indian Journal of Mushroom. 1982; 8:40-43.
5. Cunnington AM. The effect of physical conditions on the development and increase of some important storage mites. Annual Applied Biological sciences. 1976; 82:175-178.
6. Gahukar RT. Mushroom Pest and Disease Management Using Plant-Derived Products in the Tropics: A Review, International Journal of Vegetable Sciences. 2014; 20:78-88.
7. Gulati R, Singh D, Bhatnagar P. Acarine fauna Associated with *Agaricus bisporus* compost. Mushroom Research. 2009; 18(2):79-82.
8. Ahmed N, Rady GH, Abdelnabby H, Weihua M, Liu S Wang M. Damage effect of two storage mites (Acari: Acaridida) and their biology on the Shiitake vnmushroom (*Lentinula edodes*) at three constant temperatures. International Journal of Acarology. 2012; 38(3):230-235.
9. Rodriguez JG, Rodriguez LD. Nutritional ecology of stored product and house dust mites. In: Nutritional Ecology of Insects, Mites, Spiders, and Related Invertebrates.1987, 345-368.
10. Singh M, Gulati R. Minimization of losses due to mites in major pulses during storage. Final Technical Report. CSIR, New Delhi, 2001, 1-129.
11. Anita. *Feeding potential of Tyrophagus putrescentiae Schrank (Acari: Acaridae) and its management*. M.Sc. Thesis, CCSHAU, Hisar. 2010, 82.
12. Anita, Gulatii R, Monika, Kaushik HD, Arvind. Quantitative losses in green gram [*Vigna radiata* (L.)] Wilczek) due to *Tyrophagus putrescentiae* (Schrank) (Acari: Acaridae). Legume Research. 2014; 37(6):670-674.