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Research Article

FECUNDITY OF *AMBLYSEIUS MULTIDENTATUS* AND *AMBLYSEIUS ALSTONIAE* ON ALTERNATE DIET

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ABSTRACT
Castor pollen, honey, pollen + honey, pollen + yeast, honey + yeast and honey + yeast + pollen were tested as artificial diet. Maximum number of eggs laid (16.2+0.1) for *A. multidentatus* and (7.9) for *A. alstoniae* by the female predatory mite when a combination of honey + pollen + yeast was supplied as alternate diet to them. Similarly least preferred diet was honey alone because minimum fecundity was observed at this state (0.3 and 0.2). However, all the artificial diets proved much inferior to their natural food i.e. *T. cinnabarinus* for *A. multidentatus* and *E. orientalis* for *A. alstoniae*.
Keywords: *A. alstoniae, A. multidentatus,* Mite, Egg, Larvae, Nymphs

INTRODUCTION

Phytoseiid mites exhibit ubiquitous patterns from arctic to Tropics. They feed on pest mites belonging to families Tetranychidae, Tenuipalpidae, Tarsonemidae and eriophydae. Besides, insect pests representing aphids, coccids, thrips etc. are also their known prey. Thus, they play a very important role in biological control programme and have become one of the most active ingredients in IPM strategies. The systematic studies of these mites showed a tremendous advance in the past few decades on a global level. Despite this, the biological studies of phytoseiid mites still remain as a less explored area. This is especially true as far as India is concerned. Mites have a worldwide distribution; they rival insects to the extent of their habitation pest mites and predatory mites. The Red Spider mite (*Tetranychus cinnabarinus*) has attained the status of major pests of vegetable crops. Phytoseiid mites are recognized as predators of pest mites. Phytoseiid mites are very efficient predators since they have shorter life cycles than their prey, equivalent reproductive potential and thrive on alternate food. Castor pollen was found to be suitable for the development of the predatory mites.[1-3]

MATERIALS AND METHOD

Collection of samples

Leaves, Fruit, vegetable and ornamental crops were collected from three canopies of the plant. The leaves were brought to the laboratory in individual labeled polythene bags tied with rubber band. The mites were counted under stereo binocular microscope. The pest population was counted from 1 sq. cm area of the leaf randomly at three different places whereas predatory mite population was counted from the entire leaf surface. Mites were collected with the help of a needle or brush and preserved in 70 % alcohol Permanent slides were prepared in Hoyer's medium. Identification of mites was made with the help of keys. Culture of pest and predatory mites were raised in the laboratory. Culture of Phyoseiid mite was prepared at temperature of 30 + 1^0C and R.H. of 70 % in BOD's on brinjal and Anjeer leaves. Pure culture of *T. cinnabrinus* and *E. orientatis* was maintained in Lab on Brinjal and Anjeer leaves.

RESULT AND DISCUSSION

The developmental stages of the pest mite i.e. egg, larva, nymph and adults were used at 5 different prey densities (1, 2, 3, 4 and 5 in each petridish). Each treatment was replicated 5 times. The observations were recorded daily under stereo binocular microscope. The dead individuals were considered consumed by the predators. 11ly feeding potential of *A. multidentatus* and On *E. orientalis* is noted. In control set predator was not there, other things remaining the same. Statistical analysis was done through simple and three factorials ANOVA and T-test to find out the best predator for *T. cinna barinus* and *E. orientalis*. Phytoseiid mites were reared, on different diets and combination of diets to assess the best diet for mass multiplication. Six different diets were chosen as alternate diet for rearing of *A. multidentatus* and *A. alstoniae*

T_1	=	Pollen alone
T_2	=	Honey alone
T_3	=	Pollen + honey
T_4	=	Pollen + yeast
T_5	=	Yeast + honey
T_6	=	Honey + pollen + yeast

Castor pollen, honey and yeast were given as food in different combination and were placed directly on the leaf surfaces. Food droplets were added daily. Experiment was carried out with six treatments and five replications. Leaves were changed daily and mites were transferred from old leaves to new leaves. Observations were made to record the number of eggs and active stages of mites on different diets. 11ly the culture of *A. alstoniae* was maintained on Anjeer

leaf disc on the same alternate diet. Statistical analysis was done. Feeding potential of *A. multidentatus* was studied against the pest mite *T. cinnabarinus* and *E. orientalis*. Hence, most preferred diet for predatory mites was T_6. 11ly least preferred diet was honey alone (diet T_2) because minimum fecundity was observed at this stage (0.3 and 0.2) for *A. multidentatus* and *A. alstoniae*. Moderately preferred diets for predatory metes were observed to be T_1, T, T_4 and T_5. Order of preference of food as objected by number of eggs laid by *A. multidentatus* is T_6, > T_1 > T_4 > T_5 > T_3 > T_2. 11ly, for *A. alstoniae*, order of preference was T_6, > T_1 > T_4, > T_3 > T_5 > T_2 (Table 3). Feeding potential of *A. multidentatus* was studied against pest mite *T. cinnabarinus* and *E. orientalis*. According to the Table 1 the preferred pest mite was *T. cinnabarinus* 11ly for *A. alstoniae* the pest mite was *E. orientalis*. Maximum no. of eggs (16.2 + 1.01) was laid by the female predatory mites, when a combination of honey + pollen + yeast was supplied as alternate diet to the predatory mites. Hence, most preferred diet for fecundity of the predatory mite was T6. Least preferred diet was honey alone (diet T_2) because minimum fecundity was observed at this stage (0.3 and 0.2). Also moderately preferred diets for predatory mites were observed to be T_1, T, T_4, and T_5. Order of preference of food as objected by number of eggs laid by *A. multidentatus* is T_6 > T_1 > T_4 > T_5 > T_3 > T_2. 11ly for *A. alstoniae* order of preference was T_6 > T_1 > T_4 > T_3 > T_5 > T_2.

Table 1: Feeding potential of *A. multidentatus* on *T. cinnabrinus* and *E. orientalis*

Stages	Average Feeding potential of *A. multidentatus* adults/day		
	***T. cinnabrinus* consumed**	***E. orientalis* consumed**	**t_{cal}**
Egg	3.5	1.4	0.03
Larva	3.8	2.6	0.15
Nymph	2.8	1.9	0.21
Adult	3.6	2.0	1.03

Table 2: Feeding potential of *A. alstoniae* on *E. orientalis* and *T. cinnabrinus*

Stages	Average Feeding potential of *A. multidentatus* adults/day		
	***T. cinnabrinus* consumed**	***E. orientalis* consumed**	**t_{cal}**
Egg	1.0	3.8	0.01
Larva	2.5	3.8	0.34
Nymph	2.1	3.2	1.17
Adult	2.9	3.4	0.23

$t_{tab = 3.18}$

Table 3: Evaluation of Different Diets on Fecundity of *Amblyseius multidentatus* and *Amblyseius alstoniae*

Artificial died	Days after first egg release	Average number of eggs of	
		Amblyseius multidentatus	***Amblyseius alstoniae***
T_1	1	1.1 ± 0.22	1.0 ± 0.12
(Pollen alone)	2	6.4 ± 1.66	2.4 ± 1.23
	4	9.2 ± 1.06	3.3 ± 1.08
	6	10.3 ± 0.97	3.9 ± 0.91
	8	11.0 ± 1.58	6.8 ± 1.43
T_2	1	0.1 ± 0.0	0.01 ± 0.0
(Honey alone)	2	0.1 ± 0.0	0.10 ± 0.0
	4	0.2 ± 0.0	0.20 ± 0.0
	6	0.2 ± 0.0	0.20 ± 0.0
	8	0.3 ± 0.0	0.20± 0.0
T_3	1	3.0 ± 1.55	2.0 ± 0.2
(Pollen + Honey)	2	4.0 ± 1.54	2.6 ± 0.70
	4	4.8 ± 1.68	3.8 ± 0.10
	6	5.9 ± 3.72	3.9 ± 1.10
	8	6.2 ± 3.90	4.9 ± 2.90
T_4	1	3.92 ± 1.96	1.4 ± 1.04
(Pollen + Yeast)	2	5.8 ± 3.63	2.4 ± 2.69
	4	7.8 ± 2.79	3.7 ± 2.00
	6	9.9 ± 3.96	4.0 ± 2.14
	8	10.4 ± 4.65	6.0± 3.94
T_5	1	3.9 ± 1.96	1.0 ± 0.0
(Honey + Yeast)	2	5.8 ± 3.63	2.0 ± 0.01
	4	7.8 ± 2.79	3.0 ± 0.02
	6	9.9 ± 3.96	3.5 ± 0.02
	8	10.3 ± 0.97	4.0± 0.01
T_6	1	5.0 ± 4.69	2.0 ± 1.04
(Pollen + Honey + Yeast)	2	7.2 ± 2.85	3.0 ± 1.02
	4	10.4 ± 1.51	5.2 ± 1.40
	6	12.0 ± 1.68	7.3 ± 1.00
	8	16.2 ± 1.01	7.9 ± 1.25

Table 4: Evaluation of Different Diets for Mass Multiplication of *Amblyseius multidentatus* and *Amblyseius alstoniae*

Artificial died	Days after first adult formed	Number of *A. multidentatus*	Number of *A. alstoniae*
T_1	1	1.0 ± 0.00	0.0 ± 0.0
(Pollen alone)	2	1.2 ± 0.67	1.0 ± 0.3
	4	2.4 ± 0.54	2.0 ± 0.4
	6	6.1 ± 4.18	3.4 ± 3.1
	8	9.0 ± 1.00	5.0 ± 1.0
T_2	1	1.0 ± 1.21	0.0 ± 0.0
(Honey alone)	2	1.3 ± 1.10	0.0 ± 0.0
	4	2.4 ± 1.00	0.0 ± 0.0
	6	2.4 ± 1.00	0.0 ± 0.0
	8	2.5 ± 1.34	0.0 ± 0.0
T_3	1	1.2 ± 2.90	1.0 ± 0.2
(Pollen + Honey)	2	2.3 ± 1.50	1.6 ± 0.6
	4	3.4 ± 1.60	1.8 ± 0.0
	6	5.8 ± 3.70	3.2 ± 1.0
	8	6.0 ± 3.80	4.1 ± 2.1
T_4	1	2.0 ± 1.41	1.2 ± 1.0
(Pollen + Yeast)	2	2.4 ± 2.30	2.0 ± 2.1
	4	5.8 ± 1.92	4.9 ± 2.0
	6	6.4 ± 4.35	5.4 ± 3.9
	8	7.6 ± 4.93	5.8 ± 4.0
T_5	1	2.0 ± 1.22	1.8 ± 1.0
(Honey + Yeast)	2	2.4 ± 2.07	2.3 ± 2.0
	4	6.4 ± 2.90	6.3 ± 2.8
	6	7.0 ± 2.73	6.0 ± 2.5
	8	9.0 ± 2.83	8.3 ± 2.7
T_6	1	2.0 ± 1.87	2.0 ± 1.0
(Pollen + Honey + Yeast)	2	2.4 ± 0.96	2.0 ± 0.8
	4	6.4 ± 3.04	6.2 ± 2.0
	6	7.4 ± 2.57	6.4 ± 2.0
	8	11.8 ± 6.49	9.3 ± 4.3

CONCLUSION

Maximum adults were being produced in shortest period when the predator was feeding on a diet made up of honey + yeast + pollen. The poorest performance was observed when predator was forced to feed on honey alone (T_2). The 2nd most suitable artificial diet was honey + yeast for both *A. multidentatus* and *A. alstoniae*. For *A. multidentatus* the third preferred food was T1 (pollen alone) but for *A. alstoniae* it was T_4 (pollen + yeast). The 4th in position in term of adults production for *A. multidentaus* it was T_4 (pollen + yeast) but pollen alone (T_1) for *A. alstoniae*. The fifth position for both the predatory mite was pollen + honey (T_3). All the artificial diets [including the best one (T_6)] were found to be inferior to the natural diet namely *Tetranychus cinnabarinus* for *A. multidentatus* and *Euteranychus orientalis* for *A. alstoniae*.

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