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#### Research Notes

### Life table studies for rice leaf folders

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Rice crop is vulnerable to attack by more than 800 insect species. In tropical Asia, 20 species are of major importance and of regular occurrence (Dale, 1994). The high magnitude of yield loss in rice is largely attributed to the lepidopterous stemborers, homopterous leaf-and plant hoppers and a complex of leaf feeding insects. In the later group, rice leaf folders are the main species (Reissig *et al.* 1986). Sabaratinam and Vennila (1996) had indentified that the research on the leaf folders is the most important technical need for the farmers of Tamil Nadu. Though reports are available on the rice leaf folders, the life table study for the rice leaf folder is wanting.

Leaf folders viz. *Cnaphalocrosis medinalis* Gueene and *Marasmia patnalis* Bradley were reared following the method of Waldbauer and Marciano (1979). Ten pairs of newly emerged adults were allowed to mate and the mated females were introduced into wooden oviposition cages (45x45x60 cm) having 45-day-old Taichung Native 1 (TN 1) plant for four days. One day after oviposition, the plants with eggs were removed and placed separately in wooden rearing cages (45x45x60 cm) for hatching. The larvae

hatched from 100 eggs of each species (*C.medinalis* and *M.patnalis*) were individually reared on TN 1 plants. The larvae were maintained separately to study the developmental period, survival and longevity. The average temperature and relative humidity during the study period (August 1998 to April 2000) was 26.1°C to 32.9°C and 76.0 to 93.5 per cent respectively. The life table was constructed as per the method of Carey (1993).

The life table studies revealed that the egg period lasted for 7 days, larval period 25 days, pupal period 7 days and the adult longevity 9 days for *C.medinalis* while it was 8, 29 and 8 days respectively for *M.patnalis* (Table 1 and 2). *C.medinalis* suffered the highest mortality during the larval stage (12.00%) than during the egg stage (10.00%) and the pupal stages (5.00%), while *M.patnalis* suffered a heavy mortality during egg (18.00%) and larva (15.00%) when compared to the pupa (2.00%). Among the two cohorts *C.medinalis* reached adulthood of 73 per cent while in *M.patnalis* only 65 per cent reached adulthood. The expectation of life of a newly hatched larva was 32.29 days and the entropy value for *C.medinalis*

Table 1. Life table for *C. medinalis* and *M. patnalis*

Stage (n=duration in days)	Age interval	Fraction living at age x	Fraction surviving from x to x+1	Fraction dying from x to x+1	Fraction dying in interval x to x+1	Days lived in interval	Number of days lived beyond age x	Expectation of life
	x	lx	np <sub>x</sub>	nq <sub>x</sub>	nd <sub>x</sub>	L <sub>x</sub>	T <sub>x</sub>	ex
Egg								
<i>C. medinalis</i> (n=7)	0-7	1.00	0.90	0.10	0.10	2.85	32.27	32.27
<i>M. patnalis</i> (n=8)	0-8	1.00	0.82	0.18	0.18	7.28	49.26	49.26
Larva - I instar								
<i>C. medinalis</i> (n=5)	7-12	0.90	0.95	0.05	0.04	4.30	29.44	32.71
<i>M. patnalis</i> (n=5)	8-13	0.82	0.91	0.09	0.04	4.90	41.98	51.91
II instar								
<i>C. medinalis</i> (n=5)	12-17	0.86	0.97	0.03	0.03	4.23	25.14	29.33
<i>M. patnalis</i> (n=5)	13-18	0.78	0.97	0.03	0.05	4.88	37.08	47.59
III instar								
<i>C. medinalis</i> (n=5)	17-22	0.83	1.00	0.00	0.00	4.15	20.91	25.19
<i>M. patnalis</i> (n=5)	18-23	0.73	0.98	0.02	0.01	4.98	32.20	44.11
IV instar								
<i>C. medinalis</i> (n=5)	22-27	0.83	1.00	0.00	0.00	4.15	16.71	20.13
<i>M. patnalis</i> (n=5)	23-28	0.72	1.00	0.00	0.00	5.00	27.22	37.80
V instar								
<i>C. medinalis</i> (n=5)	27-32	0.83	0.94	0.06	0.05	4.03	12.61	15.15
<i>M. patnalis</i> (n=5)	28-33	0.72	0.93	0.07	0.00	5.00	22.22	30.80
VI instar								
<i>C. medinalis</i>								
<i>M. patnalis</i> (n=4)	33-37	0.72	0.93	0.07	0.05	3.90	17.22	23.92
Pupa								
<i>C. medinalis</i> (n=7)	32-39	0.78	0.95	0.05	0.05	5.29	8.58	11.00
<i>M. patnalis</i> (n=8)	37-45	0.67	1.00	0.00	0.02	7.92	13.32	19.88
Adult								
<i>C. medinalis</i> (n=9)	39-48	0.73	1.00	0.00	0.73	3.29	3.29	4.51
<i>M. patnalis</i> (n=8)	45-53	0.65	0.00	1.00	0.65	5.40	5.40	10.80

Entropy value = 0.31

Growth index = 2.92

Entropy value = 0.31

Growth index = 2.92

reflected that 0.31 days would be gained by the average individual if every first death were averted while the entropy value for *M.patnalis* was 0.45 and the expectation of life of a newly hatched larva was 49.26 days. The growth index was higher (2.29) for *C.medinalis* than *M.patnalis* (2.24).

This study indicated that more than 10 per cent egg and larval mortality in both species and 10 per cent egg mortality was perceived earlier in *C.medinalis* and *M.patnalis* (Waldbauer and Marciano, 1979 and Joshi, 1985). More than 60 per cent of both the species reached adult hood which is lower than that reported by Waldbauer and Marciano (1979) for *C.medinalis* (87.00%). In both, larval mortality before pupation was observed and this explains lower adult emergence. Among the two species, *C.medinalis* has better survival capabilities than *M.patnalis* which may be the reason for its dominance in the field. Barrion *et al.* (1991) confirmed the dominance of *C.medinalis* in the field conditions of rice ecosystem.

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## Research Notes

## Distribution of natural enemies of rice leaf folders

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Large scale outbreaks of rice leaf folders have been reported from all rice growing countries of Asia including India (Khan *et al.* 1988) from 1960's onwards. These outbreaks are attributed mostly to reduced abundance of natural enemies; as a consequence of extreme weather

conditions or the indiscriminate use of insecticides (Rajapakse and Kulasekare, 1982).

The natural enemies are essential for maintaining the pest population at low level. A vast multitude of natural enemies associated