

RESEARCH PAPER

Effect of low temperature storage of trichocards parasitised by *Trichogramma chilonis* (Ishii) and *Trichogramma japonicum* (Ashmead)

M. BHARGAVI AND K.V. NAIK

Department of Agricultural Entomology, College of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, RATNAGIRI (M.S.) INDIA
Email : baachi.agbsc@gmail.com; kumudnaik@yahoo.in

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The present investigations were undertaken on laboratory studies of *Trichogramma chilonis* (Ishii) and *Trichogramma japonicum* (Ashmead) during the year 2013-2014 in the bio-control laboratory, Department of Agricultural Entomology, College of Agriculture, Dapoli (Maharashtra). Effect of low temperature storage at 15°C temperature for varying period on egg cards parasitised by *T. chilonis* and *T. japonicum*, 4 day after parasitisation revealed that parasitised trichocards after 4 days of parasitisation can effectively stored up to 15 days without much effect on adult emergence.

Key words : Adult emergence, Parasitisation, *Trichogramma chilonis*, *Trichogramma japonicum*

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INTRODUCTION

Trichogrammatids are one of the important parasitoids amenable for mass production, which can be accomplished by mass culturing its factitious host, either *Corcyra cephalonica* (Stainton) or *Sitotroga cerealella* (Olivier). Due to its amenability to mass production, this group of parasitoids has the distinction of being maximum produced and released in the world. These minute endoparasitoids of insect eggs are released in crops or forest in large numbers (up to several millions/ha) as per the presence of pest eggs. *Trichogramma* wasps, minute in size from the friendly insect fauna, are used as biological control agent against lepidopterous insects in integrated pest management of crops and vegetables (Nagarkatti and Nagaraja, 1977). It is a very aggressive parasitoid and has the ability to increase in number. *Trichogramma* are being used to control lepidopterous

pests of cotton, cabbage, apple and tomato etc. (Smith, 1996). It is the widely used natural enemy of pests owing to its rearing abilities in insectaries and ravenous parasitising tendency on eggs of variety of target hosts.

RESEARCH METHODOLOGY

Effect of low temperature storage on parasitised trichocards:

The details regarding the different storage periods at refrigerated conditions are mentioned as below :

Design : C.R.D.
Treatments : 9
Repetitions : 3

Thirty trichocard strips of size 4 x 3.5 cm for each species of *Trichogramma* were marked on 15 x 8 cm cardboard paper accommodating 10-strips/paper. Hundred U.V. sterilized *Corcyra* eggs were glued on

Tr. No	Storage period (days)
T ₁	5
T ₂	10
T ₃	15
T ₄	20
T ₅	25
T ₆	30
T ₇	35
T ₈	40
T ₉	45

each strip and air-dried. They were then mass exposed to freshly emerged adults of both *T. chilonis* and *T. japonicum* separately for 24 h. Individual strip was then carefully cut when eggs turned black (5 days after parasitisation) and was kept in a separate plastic vial with secured cap (7.5 × 7 cm), which further was marked for days to be kept in refrigerator with a marker pen. All such vials along with strips were kept in refrigerator at 5th day of parasitisation and were removed after specific storage period. Observations on per cent adult emerged was recorded to judge the effective storage period for both the species.

RESEARCH FINDINGS AND ANALYSIS

The findings of the present study as well as relevant discussion have been presented under following heads :

Effect of low temperature storage of trichocards parasitised by *T. chilonis* and *T. japonicum* :

Trichocards prepared in the laboratory needs to be

refrigerated when no demand or congenial conditions for release in the field are absent. Under such situation the question arises, up to how much period and temperature the trichocards could be effectively stored without hampering the adult emergence. To understand this, study on storage of trichocards parasitised by *T. chilonis* and *T. japonicum* separately in refrigerator for varying periods was undertaken. The results are summarized below.

Effect of low temperature storage of trichocard parasitised by *T. chilonis* :

The data revealed that maximum per cent adult emerged were recorded at 5-day storage (96.50 %) followed by 10-day (95.72 %) which were at par. Further, 15-day storage recorded 70.25 per cent adult emergence, while 20, 25, 30, 35 day storage recorded 36.88, 30.14, 32.25, and 33.26 per cent adult emergence, respectively and remained at par. Almost 65 per cent adult emergence was reduced at 35- day storage (33.26 %). Further reduction in adult emergence was noticed at 40 day storage with 13.55 per cent. There was no adult emergence (0.00%) was recorded at 45 day storage period Table 1.

From the above results it was revealed that trichocards parasitised by *T. chilonis* could be stored effectively without much damage to the adult emergence upto 15 days at 15°C. Earlier work of Khosa and Brar (2000) on storage study with *T. chilonis* strain collected from different places revealed that at 8 to 10°C the mean per cent adult emergence was 96.2, 88.5, 85.1, 81.2, 73.2, 49.1, 33.6, 14.5 and 1.7 for a period of 1, 7, 15, 22, 29, 36,

Tr. No.	Storage period (Days)	Mean per cent adult emergence
T ₁	5	96.50 (79.24)
T ₂	10	95.72 (78.18)
T ₃	15	70.25 (56.94)
T ₄	20	36.88 (36.80)
T ₅	25	30.14 (33.24)
T ₆	30	32.25 (34.45)
T ₇	35	33.26 (35.08)
T ₈	40	13.55 (21.49)
T ₉	45	0.00 (2.12)
S.E. ±		3.41
C.D. (P=0.05)		10.15

Note: Figures in the parentheses are arcsine values

43, 50 and 57 days, respectively. Similarly, Gupta and Bhardwaj (2002) also reported that storage of *Trichogrammatoidea bactrae* Nagaraja at 15°C for 10 days after 5 days of parasitisation was appropriate. Mehendale (2009) studied the effect of cold storage under refrigerated conditions at 15°C temperature for varying periods on 4 days after parasitisation of trichocards by *T. chilonis*. He reported that per cent adult emergence was quite high at 5 days storage (89.0 %) followed by 10 days (86.0 %), 15 days (79.31 %), 20 days (68.47 %), 25 days (63.97 %) and 30 days (63.80 %). Thereafter, the adult emergence declined drastically. He further concluded that parasitised trichocards could be stored effectively up to 30 days at 15°C. Pathak *et al.* (2010) studied the suitability of temperature for the storage of *T. chilonis*. They reported that among the treatment combinations, best treatment proved to be storage of cards at 15°C for 30 days after 5 days of parasitisation, when highest parasitoid emergence was observed (72.4%).

Effect of low temperature storage of trichocard parasitised by *T. japonicum* :

The data revealed Table 2 that maximum per cent adult emerged were recorded at 5-day storage (95.09 %) followed by 10-day (77.72 %) and were at par. Further 15-day storage recorded 51.30 per cent adult emergence, while 20 and 25 day storage recorded 35.20 and 34.46 per cent adult emergence, respectively and remained at par. This was followed by 30 and 35 day storage with 22.65 and 19.36 per cent adult emergence. Almost 80 per cent adult emergence was reduced at 35-day storage (19.36 %). Further drastic reduction in adult emergence was noticed at 40 and 45-day storage with 3.08 and

0.89 per cent, respectively and were at par.

From the above results it was revealed that trichocards parasitised by *T. japonicum* could be stored effectively without much damage to the adult emergence upto 15 days at 15°C. Vishla *et al.* (2008) worked on the effect of storage period on the emergence and parasitisation efficacy of Trichogrammatids. They reported that the parasitised eggs of *C. cephalonica* stored at 10°C showed decreasing trend of parasitoid emergence with the increase in storage period. It reached 30.25 per cent from 81.25 per cent after 30 days of storage. The parasitisation efficacy of adults Trichogrammatids also decreased with the increase in storage period, which reached 52.25 per cent from 79.50 per cent after 10 days. Wherein, Trichocards can be stored for 10 days at 10°C without significant reduction in the emergence and parasitisation efficacy of Trichogrammatids female.

Mehendale (2009) worked on effect of cold storage under refrigerated conditions at 15°C temperature for varying periods on 4 days after parasitisation of trichocards. He reported that per cent adult emergence was quite high at 5 days storage (89.0 %) followed by 10 days (86.0 %), 15 days (79.31 %), 20 days (68.47 %), 25 days (63.97 %) and 30 days (63.80 %). Thereafter, the adult emergence declined drastically. He further concluded that parasitised trichocards can be stored effectively up to 30 days at 15°C. Nadeem *et al.* (2010) worked on the optimization of short and long term storage duration for *T. chilonis* at low temperatures. They revealed that the highest (96.60 %) *T. chilonis* emergence recorded at 10°C after 5 days storage and was similar to control (97.40 %). However, emergence

Tr. No.	Storage period (days)	Mean per cent adult emergence
T ₁	5	95.09 (77.43)
T ₂	10	77.72 (63.39)
T ₃	15	51.30 (45.79)
T ₄	20	35.20 (36.23)
T ₅	25	34.46 (35.60)
T ₆	30	22.65 (28.15)
T ₇	35	19.36 (26.08)
T ₈	40	3.08 (8.19)
T ₉	45	0.89 (3.13)
S.E. ±		4.23
C.D. (P=0.05)		12.59

was reduced up to 22.80 per cent at 10°C after 90 days storage. The parasitism was highest (97.40 %) at 10°C after being kept for 5 days storage and was decreased to 42.20 per cent at 10°C when stored for 90 days at same temperature. The adult longevity was decreased from 6.3 to 3.0 days when stored at 10°C from 5 to 90 days, respectively. Dileep (2012) worked on the effect of low temperature storage on parasitised trichocards of *T. chilonis*. The results revealed that maximum per cent adult emergence was recorded at 5 day storage (88.67%) followed by 10 day storage (85.33%) which were at par with 5 days storage period. Further 15 day storage period recorded 76.67 per cent adult emergence, while 20 and 25 day storage recorded 65.33 and 63.67 per cent adult

emergence, respectively and remained at par, followed by 30 day storage with 60.67 per cent adult emergence. Almost 50 per cent adult emergence was reduced at 35 day storage (50.67%). Further, reduction in adult emergence was noticed at 40 and 45 day storage with 22.33 and 8.33 per cent, respectively. He concluded that, trichocards could be stored effectively without much damage to the adult emergence up to 30 days at 15°C.

Conclusion :

From the above results it can be concluded that four days after parasitisation trichocards of *T. chilonis* and *T. japonicum* could be stored effectively up to 15 days at 15°C.

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