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# Effect of cold storage temperature on parasitization efficiency by *Trichogramma chilonis* on stored *Corcyra cephalonica*

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## ABSTRACT

The eggs of *Corcyra cephalonica* were stored at four different cold storage temperature viz. 4±1°C, 8±1°C, 10±1°C and 12±1°C for storage duration 15, 25, 35 and 45 days in refrigerator and BOD incubators. The parasitization efficiency on stored *Corcyra* egg by mother culture of *Trichogramma chilonis* were studied under standard laboratory condition. The parasitization is found to be maximum (92.30%) when *Corcyra* egg stored at 4±1°C upto 15 days. The per cent parasitization gradually decreased with the increase in duration. After 25, 35 and 45 days of storage the parasitization were reduced to 75.20%, 73.50% and 40.50% respectively at 4±1°C followed by 8±1°C with 82.60%, 75.30% and 25.60% respectively. The parasitization 86.00% was found to be highest at 10±1°C for 15 days of storage followed by 8±1°C (85.70%). The parasitization rate gradually decreasing with increase in storage duration and reached to 52.55% at 10±1°C upto 45 days of storage. The 4±1°C is best temperature for storage of *Corcyra cephalonica* egg followed by 10±1°C upto 45 days of storage. The higher temperature 12±1°C were found unsuitable for storage of *Corcyra cephalonica* egg.

**Key words:** Parasitization, *Trichogramma chilonis*, Storage, *Corcyra cephalonica*

## Introduction

*Trichogramma* species are mostly used in biological control as a egg parasitoids for different insect pest of different crops through augmentation and release. Trichogrammatids are a group of minute wasps of great importance to biological control. *Trichogramma chilonis* is dominant species in India which is very aggressive parasitoid gives near to 100 per cent parasitization according to availability of favourable condition as it has ability to increase their capability. (Nagarkatti and Nagaraja, 1979). Most important thing is that host eggs is require for mass rearing and preparation of trichocard and sub-

sequently release in the field. For proper control of pests fitness of parasitoids play major role and for that good quality host eggs required (Farahani *et al.*, 2016; Grenier *et al.*, 1986; Peverieri *et al.*, 2015). Generally cold storage is followed to meet the demand of farmers as and when required and to reduce wastage in biological material, *Trichogramma* mass rearing and host eggs storage (Spinola *et al.*, 2014; Colinet and Boivin, 2011; Huang *et al.*, 2017; Peverieri *et al.*, 2015). However, cryopreservation of parasitoid focus in most the studies while storage of host eggs in cold temperature is rarely investigated (Krechemer and Foerster, 2016; Tezze and Botto, 2004; Colinet and Boivin, 2011; Özder, 2004;

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Tuncbilek *et al.*, 2009).

Among *Trichogramma* species *Trichogramma chilonis* (Ishii) the egg parasitoid (Hymenoptera; Trichogrammatidae) is an important in IPM of lepidopteran insect pest of crop and vegetables like cotton, tomato, cabbage and apple (Smith, 1996). The *trichogramma* species have proved to be effective when it followed by inundative release against the several pest especially when the its development is not interrupted by different chemical pesticides (Briere *et al.*, 1999; Garcia *et al.*, 1995b). Therefore, the cold storage technique development almost important for biocontrol for helping efficient in mass production to obtain a desired stage of development for peak release of agents and to make available standardized stocks for research used (Greenberg *et al.*, 1996 and Ravensberg, 1992). Cold storage can permit a more cost effective production schedule (Glenister and Hoffmann 1998) by using this cold storage technique conserving biological control agents at laboratory and used as per requirement for release (Pitcher *et al.*, 2002).

*Corcyra cephalonica* is an excellent laboratory host for mass production of *Trichogramma* species. Cold storage of *Corcyra* eggs for 10 and 15 days observed 100 and 89 per cent parasitization by *T. chilonis* respectively (Anonymous, 1996). If we are able to enhance shelf life of *T. chilonis* and *C. cephalonica* than eggs will be available in off season thus helpful to entrepreneurs and biological laboratories. Hence the present study was conducted to estimate the effects of temperature on parasitizing potential of laboratory reared *T. chilonis* on stored eggs of its factitious host *Corcyra cephalonica*.

## Materials and Method

The present study on effect of cold storage on the parasitization by *T. chilonis* on stored *Corcyra cephalonica* egg was carried out at Biocontrol laboratory, College of Agriculture Nagpur. The experiments were carried out for host eggs *C. cephalonica* with a completely randomized experimental design with 4 different temperatures as a treatment replicating 5 times.

### Rearing of *Corcyra cephalonica*

Culture of *C. cephalonica* was obtained from the Biocontrol lab College of Agriculture Nagpur and maintained in controlled condition 27-30°C temperature 70±1% humidity (RH) with complete dark-

ness in laboratory. The culture of test insect *C. cephalonica* was maintained on sorghum grains. The sorghum grains free from any infestation were sterilized in autoclave at 100 °C for 25 min and milled to 3-4 pieces of each grain in milling machine. About 2.5 kg crushed grains were mixed with 100 gm of groundnut flour and 5 gm yeast was kept in plastic box also 0.05 mg streptomycin sulphate and 5 gm sulphur was added in each tray to avoid bacterial and mite infection respectively. Added 0.5 cc (8000-9000) live eggs of *Corcyra* uniformly in rearing basket. This basket was secured with tight lid having wire mesh at the centre kept in racks. The neonate larva feed on sorghum grains and form web like structure then full grown larva pupation of fully matured larvae takes place in web sorghum grains mass for 38-40 days from date of egg inoculation. The moth emerged from 40<sup>th</sup> days were collected daily and transferred into well design egg laying chamber. The eggs were collected from egg laying chamber and used for storage at different temperature.

### Per cent parasitization by *T. chilonis* on stored *Corcyra cephalonica*

The experiment was conducted with live egg of *Corcyra* were stored at different temperature at 4±1°C, 8±1°C, 10±1°C and 12±1°C each for 15, 25, 35 and 45 days. After fixed storage days egg were taken out from the refrigerator and BOD incubators and kept at room temperature for 3 h and UV irradiated and 2000 egg were pasted on card strips with the help of Arabic gum. The *Corcyra* egg card were exposed to adult of *Trichogramma* @ 10:1 host parasitoid ratio. The total number of egg parasitized from the strips were counted based on blackened egg under compound microscope. Per cent parasitization were calculated by using formula.

### Statistical analysis

Data recorded during present study on per cent parasitization by *T. chilonis* on stored *Corcyra* egg were Statistically analyzed by using OPSTAT software which is available online on Hissar Agricultural University, Hissar.

## Results

Per cent parasitization by *T. chilonis* on stored *C. cephalonica* eggs (Table 1).

The result on per cent parasitization of *T. chilonis*

**Table 1.** Effect of storage on per cent parasitization by *T.chilonis* on stored *Corcyra* eggs (%)

No of storage days	Per cent parasitization by <i>T.chilonis</i> on stored <i>Corcyra</i> eggs at different temperature			
	4±1°C	8±1°C	10±1°C	12±1°C
15	92.30 (74.06)	85.70 (67.80)	86.00 (68.11)	0.00 (0.32)
25	75.20 (60.41)	82.60 (65.89)	80.50 (63.93)	0.00 (0.32)
35	73.50 (59.14)	75.30 (60.23)	71.50 (57.80)	0.00 (0.32)
45	40.50 (39.49)	25.60 (30.31)	52.55 (46.43)	0.00 (0.32)
F test	Sig	Sig	Sig	NS
SD (±m)	1.84	1.87	1.31	
CD@1%	5.58	5.67	3.97	

\*Fig in parentheses are arc sin transformed value.

on stored eggs of *Corcyra* showed that storage after fifteen days, the per cent parasitization was differed in consonance with different low temperature. At 4±1°C, the maximum per cent parasitization by *T. chilonis* on the eggs of *Corcyra* was observed (92.30%) followed by 10±1°C (86.00%). However lowest (85.70%) parasitization observed from 8±1°C when *Corcyra* egg stored for 15 days. At forty-five days parasitization on stored *Corcyra* eggs fetched significant results on parasitization by *T. chilonis*. The highest 52.55 and 40.50 per cent parasitization recorded at 10±1°C and 4±1 °C respectively when eggs of *Corcyra* stored upto forty five days. The present result enunciated the considerable parasitization on stored *Corcyra* eggs by *Trichogramma chilonis* at 10±1 °C and 4±1 °C for 45 days of storage and is in pertinent with the findings of Balsubramanian (1991) who reported that eggs of *Corcyra cephalonica* could be stored at 5°C upto 30 days without hampering parasitization by

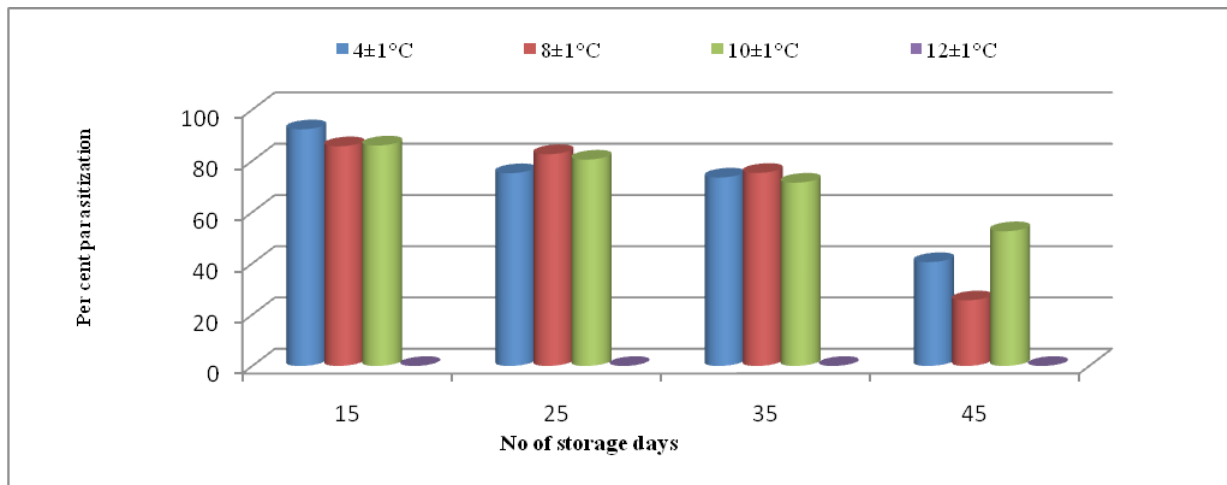
*Trichogramma pretiosum*.

**Conclusion**

It can be ensured that eggs of *Corcyra cephalonica* can be stored upto 45 days at 4±1°C followed by 10±1°C without much hampering its parasitization efficiency. However, treatment 12±1°C recorded non-significant at 15 to 45 days of storage. The data recorded during present study may be utilized for improving the protocol for mass rearing of *Corcyra cephalonica* Stainton in laboratory condition and availability of trichocard in offseason for field release availability of trichocard in off season.

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**Fig. 1.** Percent parasitization by *T. chilonis* on stored eggs of *C. cephalonica*

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