

## ARTIFICIAL HATCHING OF SILKWORM EGGS BY ACID TREATMENT

by

Mian M. Muslim<sup>1</sup>

**Summary.** Artificial hatching of silkworm eggs of Korean variety (Jam 103 x Jam 104) F-2 was conducted by treating them with HCl solution of different concentrations and for different durations at 46°C; after 21 hours of oviposition. Treatment with 14.5% HCl solution for a period of 5.5 minutes was found to be most suitable for obtaining maximum useful hatchability (98%) under local conditions.

**Introduction.** The hibernating eggs laid by univoltine or bivoltine races of silkworm undergo a state of dormancy called diapause and do not hatch till the following spring. In Pakistan, the silkworm rearing is based on hibernating eggs which are either produced locally or imported. As the hibernating eggs could produce only one generation in a year therefore it is a limiting factor for continuous rearing. This limitation has been overcome by developing methods for artificial hatching (Krishnaswami, 1973) and the most successful and rather the only method practised at present is the acid treatment. In Japan about 60% of the cocoon production comes from summer and autumn crops and about the same percentage of egg produce is subjected to acid treatment to effect artificial hatching.

In Pakistan, mulberry grows continuously from early spring to late autumn in abundance and the silk output can be increased substantially by introducing summer and autumn rearing of the current races—through artificial hatching. This investigation was taken up to find out the most suitable strength of HCl solution and the period of its treatment so as to stop the eggs from entering into diapause and to effect hatching.

**Review of Literature.** Among the various methods of physical stimuli employed to induce artificial hatching, the most successful and the only method widely practised at present is the acid treatment. The commonest method of acid treatment is to subject the freshly laid eggs, within 20 to 24 hours of laying, to hydrochloric acid, which stops the eggs from entering into diapause. This treatment, as reported by Krishnaswami, 1973 is most effective when the eggs are treated within 20 to 24 hours of layings kept at a temperature of 25°C. To obtain the best results the hydrochloric acid must be absolutely pure. The optimum specific gravity of the acid solution is reported to be 1.064 at 46.1°C. Usually the duration of acid treatment varies from 4 to 6 minutes depending upon the race and the age of eggs at the time of treatment.

**Material and Methods.** F-1 hybrid eggs of Korean varieties (Jam 103 x Jam 104) procured from Korea were incubated and reared under optimum conditions of temperature

1. The author is Research Officer Sericulture, Sericulture Research Laboratory, Punjab Forest Department, Lahore.

and relative humidity during spring 1977, in Sericulture Research Laboratory, Lahore and reproduced. The F-2 eggs were laid on April 11, 1977 at a temperature of 25 to 26°C and were kept at the same temperature till acid-treatment. Sixteen egg layings were taken and divided into eight groups of two each the eggs were given the acid treatment 21 hours after the oviposition. The temperature of the acid solution was kept constant at 46°C by the use of a water bath during treatment. The acid concentrations and the duration of treatment for each concentration is given below in respect of each group.

Group number	Concentration of HCl solution	Duration of treatment
No.	Per cent	Minutes
1	16.0	4.0
2	15.5	4.5
3	15.0	5.0
4	14.5	5.5
5	14.0	6.0
6	13.5	6.5
7	13.0	7.0
8 (Control)	No treatment was given.	

The eggs were then washed thoroughly with running tap-water at about 20°C, air dried and incubated at room-temperature (ranging from 24 to 26°C).

The hatching started on April 21 and continued till April 26. The hatching data was recorded daily, group wise by ocular observations and the useful hatchability was determined on the basis of the counts of the two major brushings and was expressed in percentage.

**Results.** The results of the experiment are given below in Table 1.

Table 1

*Practical and useful hatchability (%) of eggs soaked in HCl solution of different concentrations, for different durations recorded during hatching from April 21 to 26, 1977.*

Group No.	Conc. of HCl solution (%)	Duration of treatment. (Min)	Datewise hatchability (%)						Total hatchability (%)	Useful hatchability (%)
			21	22	23	24	25	26		
			April							
1	16.0	4.0	70	25	2	0	0	0	97	95
2	15.5	4.5	70	25	3	0	0	0	98	95
3	15.0	5.0	0	60	10	0	0	5	75	70
4	14.5	5.5	0	85	13	0	0	1	99	98
5	14.0	6.0	0	75	10	0	0	5	90	85
6	13.5	6.5	0	50	15	0	0	5	70	65
7	13.0	7.0	0	30	10	0	0	10	50	40
8	Control	(no treatment given.)	0	0	0	0	0	0	0	0

**Discussion.** It is evident from the results that the best useful-hatchability was obtained in the case of treatment: with HCl solution concentration of 14.5 per cent and duration of soaking for 5.5 minutes, when applied after 21 hours of oviposition. The results go in agreement with those reported by various Japanese investigators. (Takami 1967.)

**Acknowledgements.** The author is highly indebted to Mr. Akhalq Ahmad Khan, Conservator of Forests, Development and Working Plan Circle, Lahore for his kind guidance during the course of this work.

#### References

1. Krishnaswami, S, M.N. Narasimhanna and S. Kumararaj 1973 Manual on sericulture: Volume 2—silkworm rearing. FAO: AGS: ASB/15, pp. 51-53. Rome, Italy.
2. Takami, Takeo. 1967. Introduction to silkworm rearing (Part I) Japan Silk Association Inc., Tokyo, Japan.