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Serichlor, A New Disinfectant in Indian Sericulture

M. Balavenkatasubbaiah*, B. Nataraju, S. D. Sharma, T. Selvakumar, K. Chandrasekharan and P. Sudhakara Rao

Central Sericultural Research and Training Institute, Srirampura, Mysore - 570 008, India.

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Silkworm diseases are better prevented than cured. Disinfection and hygiene are the two important aspects in silkworm rearing to prevent the diseases. Suitable disinfectant is the primary need to disinfect the rearing house, its surroundings and appliances to eliminate the persistent pathogens from the rearing environment. In this direction, Serichlor, a new disinfectant in Indian Sericulture marketed as Serichlor-60 (contains 60,000 ppm of chlorine dioxide) and Serichlor-20 (contains 20,000 ppm of chlorine dioxide) has been evaluated for its germicidal effect against the pathogens of silkworm, *viz.*, spores of *Nosema bombycis*, *Bacillus thuringiensis*, polyhedra of BmNPV and conidia of *Beauveria bassiana* both *in vitro* and *in vivo*. Results indicated that high concentration (2,500 ppm of chlorine dioxide) is required to kill all the pathogens at 100% level. The efficacy of the Serichlor was greatly enhanced by the addition of 0.5% slaked lime solution. 500 ppm of chlorine dioxide in 0.5% slaked lime solution was found effective against all the pathogens tested. This concentration of disinfectant was also found effective for disinfection of rearing house, rearing appliances and silkworm egg surface. The disinfectant is stable, non hazardous, least corrosive and most suitable for Indian Sericulture.

Key words: Serichlor-60, Serichlor-20, Chlorine dioxide, Disinfectant, Silkworm, *Bombyx mori* L., Pathogens

Introduction

One of the major constraints in silk production is the diseases in silkworm rearing. All the major pathogenic microbes cause disease in silkworm and the most common among them are Nuclear polyhedrosis, Bacterial and Viral flacherie, Muscardine and Pebrine. Diseased silkworm extrudes pathogens into the rearing environment, which form the source for the diseases in the colony. These diseases are best prevented than cured. The diseases in silkworm are prevented through proper disinfection and rearing hygiene. Disinfection of rearing house and appliances eliminates the persistent pathogens. Chemical disinfectants are used for disinfection. Different disinfectants *viz.*, formalin (Kagawa, 1980), bleaching powder (Kobayashi *et al.*, 1968; Balavenkata-subbaiah *et al.*, 1994a), iodine compounds (Kawakami, 1970; Venkata Reddy *et al.*, 1990) and calcium hydroxide (Iwashita and Zhou, 1988) have been recommended for disinfection. However, the recommended disinfectants have some constraints being either hazardous or unstable. Recently, stabilized Chlorine dioxide manufactured as Sanitech (20,000 ppm of chlorine dioxide). was found to be stable, non-hazardous and suitable for disinfection of infra structural facilities available with the farmers (Balavenkata-subbaiah *et al.*, 1999). M/S Lakshmi Industries, Indore, Madhya Pradesh, India have also come out with a product containing 60,000 ppm chlorine dioxide in addition to product having 20,000 ppm. In the present study these products were evaluated for suitability and adoptability of the product in Indian sericulture.

Materials and Methods

Serichlor-60 and Serichlor-20

Serichlor-60 and Serichlor-20 are the two products manufactured by M/S Lakshmi Industries, Indore, 449, Jawahar Marg, Indore – 452 007, Madhya Pradesh, India. The products contain stabilized chlorine dioxide. Serichlor-60 and 20 containing chlorine dioxide of 60,000 ppm and 20,000 ppm respectively.

*To whom correspondence should be addressed.
Central Sericultural Research and Training Institute, Mysore - 570 008, India. Fax: 091-0821-236284; E-mail: mbvsubbaidh@yahoo.com

Effectiveness of serichlor against silkworm pathogens preparation of disinfection solution

Serichlore-60 (60,000 ppm) was diluted three times with water to obtain a concentration of 20,000 ppm and activated using activator crystal per 100 g/lt. of diluted solution. Serichlor-20 (20,000 ppm) was also activated using activator per 100 g/lt. These solutions were further diluted to obtain disinfection solution of 100, 200, 300, 400 and 500 ppm.

The germicidal effect of the different concentrations of the Serichlor-60 and Serichlor-20 were tested i*n vitro* against silkworm pathogens *viz.*, *Beauveria bassiana* (1×10^8 conidia/ml), and *Bacillus thuringiensis* (1×10^8 spores/ml). 1 ml of these pathogens separately were centrifuged and the pellets were suspended in different concentrations of serichlor solutions (100 – 500 ppm) for different durations (10, 20 and 30 min) at 25 ± 1°C. Then the pathogens were sedimented, washed in sterilized distilled water by repeated centrifugation. The final pellet containing the pathogen was re suspended in 1 ml of sterilized distilled water and tested for their viability by culturing them in their respective culture media. 0.1 ml of *Beauveria bassiana* conidia were suspended in 5 ml of Samsinokova's culture media and incubated at 25 ± 1°C for a period of 10 days. In the case of *Bacillus thuringiensis*, 0.1 ml of treated spore suspension was suspended in 5 ml of Nutrient broth media and incubated at 25 ± 1°C for a period of 2 days. The culture media was observed for growth of fungus/bacteria and recorded. One control culture having conidia exposed to no treatment (inoculated control) was maintained for comparative purpose.

The germicidal effect of the different concentrations of the Serichlor-60 and Serichlor-20 were tested i*n viro* against silkworm pathogens *viz.*, *Nosema bombycis* (1×10^7 spores/ml), Nuclear polyhedrosis virus (1×10^6 polyhedra/ml), *Bacillus thuringiensis* (1×10^8 spores/ml) and *Beauveria bassiana* (1×10^8 conidia/ml). As mentioned above these pathogens were suspended separately in different concentrations of Serichlor-60 and Serichlor-20 solutions (100 – 3000 ppm) for different durations (10, 20 and 30 min.) at 25 ± 1°C. After the treatment duration the pathogens were sedimented, washed and used for bioassay to determine the infectivity of the pathogens. 0.25 ml of these pathogens (*N. bombycis*, BmNPV polyhdera and *B. thuringiensis*) were per orally inoculated to 25 larvae of third instar (Immediately out of II moult). Four replications were maintained for each treatment and reared for a period of 10 days. In case of *B. bassiana* the treated conidia were inoculated per cutaneously. Observations were recorded for disease developed and mortality. A control, inoculated with silkworm pathogens having no exposure to the disinfectant (inoculated control) was maintained for the comparative study.

Enhancement of disinfection ability of serichlor

Serichlor is effective at a concentration of 2500 ppm against nuclear polyhedrosis virus while it is effective against other silkworm pathogens at lower concentration of 300 ppm. It means that the effective concentration to be used for disinfection in sericulture is a minimum of 2500 ppm and it works out to be uneconomical. In order to lower the cost of disinfection, improvement in the efficacy of the disinfectant was necessary. In order to lower the cost of disinfectant, slaked lime was added to disinfectant solution. Slaked lime is a well known for antiviral activity (Balavenkatasubbaiah *et al.*, 1994b).

Different concentrations of Serichlor-60 and Serichlor-20 were prepared in slaked lime solutions and tested *in vitro* against and silkworm pathogens *viz.*, *Bacillus thuringiensis* and *Beauveria bassiana*. As described above, these pathogens were suspended separately in different concentrations of Serichlor-slaked lime solutions (100, 200, 300, 400 and 500 ppm and 0.3, 0.4, 0.5 and 0.6%) for different durations (10, 20 and 30 min). After the completion of the duration the pathogens were sedimented, washed and tested for their growth in their respective culture media.

The efficacy of the Serichlor-60 and Serichlor-20 with slaked lime solutions was tested i*n vivo* against silkworm pathogens *viz.*, *Nosema bombycis,* Nuclear polyhedrosis virus, *Bacillus thuringiensis* and *Beauveria bassiana.* As mentioned above, the pathogens were suspended separately in different concentrations of Serichlor (300 – 600 ppm) - slaked lime (0.3 – 0.6%) solutions for different durations (10, 20 and 30 min). After the completion of the duration the pathogens were sediment, washed and used for bioassay to determine the infectivity of the pathogens. The pathogens (*N. bombycis*, *B. thuringiensis* and BmNPV polyhdera) were fed per orally and in case of *Beauveria bassiana* the treated conidia were inoculated per cutaneously and observed for infection and disease development in silkworm.

Efficacy of serichlor–slaked lime solution as rearing house, appliances and egg surface disinfectant

Based on the observation of the results of *in vitro* and *in vivo* studies, Serichlor-60/Serichlor-20 (ClO_2 : 500 ppm) in 0.5% slaked lime solution was test verified for effectiveness in disinfection of silkworm rearing house, appliances and egg surface. The silkworm pathogens were exposed separately, in petriplates (containing 3 ml of air-dried pathogens) to the disinfectant per 1.5 lt./sq. m floor area. The pathogens were collected at different intervals after disinfection (30 min, 1, 3, 6, 12 and 24 hrs), suspended in sterilized distilled water, sedimented and washed by repeated centrifugation. The pathogens were

inoculated as described earlier. A control, inoculated with pathogen and not disinfected was maintained for comparison.

In the case of tray disinfection, 5 ml of each pathogen were sprayed individually on separate rearing trays and air-dried. These contaminated trays were disinfected by the disinfectant per 25 ml/sq. ft. surface area. To test the efficacy of the disinfectant in disinfectant in disinfection of tray, second instar silkworms (3 replications of 100 larvae each) were reared up to 10 days and observations on infection disease development and mortality during the rearing was recorded.

To test the efficacy of the disinfectant in disinfection of silkworm egg surface, silkworm eggs were surface contaminated with silkworm pathogens before head pigmentation stage (0.5 ml inoculum/laying). The contaminated layings were dipped in the disinfectant for 10 min, air-dried and incubated (25°C, 80% RH) till hatching. The larvae were brushed and reared for 10 days. The disease developed during the rearing was recorded.

Table 1. *In Vitro* studies on the germicidal action of serichlor against silkworm pathogens

Sl. no.	Treatment	ClO_2 conc. (ppm)	Duration (min)	*In vitro* efficacy	
				B. thuringiensis	*B. bassiana*
1	Serichlor-60	100	10	+	+
			20	+	−
			30	+	−
		200	10	+	−
			20	+	−
			30	+	−
		300	10	−	−
			20	−	−
			30	−	−
		400	10	−	−
			20	−	−
			30	−	−
		500	10	−	−
			20	−	−
			30	−	−
2	Serichlor-20	100	10	+	+
			20	+	−
			30	+	−
		200	10	+	−
			20	+	−
			30	+	−
		300	10	−	−
			20	−	−
			30	−	−
		400	10	−	−
			20	−	−
			30	−	−
		500	10	−	−
			20	−	−
			30	−	−
3	Inoculated control		10	+	+
			20	+	+
			30	+	+

+ : In effective: − : Effective

Results

The results of *in vitro* screening of different concentrations of Serichlor-60 and Serichlor-20 against *B. thuringiensis* and *B. bassiana* are presented in Table 1. 300 ppm and above concentrations of Serichlor-60 and Serichlor-20 were found to be effective against *B. thuringiensis* in all the tested durations. However, it is found to be effective at a lower concentration of 100 ppm and exposure duration of 20 min against *Beauveria bassiana.*

The results on i*n vivo* screening of different concentrations of Serichlor-60 and Serichlor-20 against all silkworm pathogens are presented in Table 2. 300 ppm and above concentrations of Serichlor-60 and Serichlor-20 were found to be effective against *N. bombycis* and *B. thuringiensis* even at 10 min exposure duration. In case of *B. bassiana,* a lower concentration of 100 ppm and exposure duration of 20 min was found effective. However, the nuclear polyhedra required a minimum concentration and exposure duration of 2500 ppm and 10 min respectively.

The results on the i*n vitro* screening of different concentrations of Serichlor-60 and Serichlor-20 combined with slaked lime solution against the silkworm pathogens *viz., B. thuringiensis* and *B. bassiana* are presented in Table 3 and 4 respectively. Only 500 ppm and above concentrations of Serichlor-60 and Serichlor-20 combined with slaked lime solution at 0.5 and 0.6% were found to be effective against *B. thuringiensis*. However, all the concentrations (300 – 600 ppm) combined with slaked lime solution tested were found to kill the conidia of *B. bassiana* and the pathogen did not grow in culture media.

The results on the i*n vivo* screening of different concentrations (300 – 600 ppm) of Serichlor-60 and Serichlor-20 in combination with slaked lime solution against the silkworm pathogens are presented in Table 5 and 6. It is observed that a minimum concentration of 500 ppm ClO_2 in 0.5% slaked lime and exposure duration of 10 min is essential for the disinfectant to become germicidal to all silkworm pathogens.

Serichlor was also effective at the concentration of 500

Table 2. *In Vivo* evaluation of germicidal action of serichlor against silkworm pathogens

Sl. no.	Treatment	*In vivo* efficacy against silkworm pathogens in different durations of treatments (min)											
		N. bombycis			*BmNPV*			*B. thuringiensis*			*B. bassiana*		
		10	20	30	10	20	30	10	20	30	10	20	30
	Serichlor-60												
	ClO_2 100 ppm	+	+	+	+	+	+	+	+	+	+	–	–
	200 ppm	+	+	+	+	+	+	+	+	+	–	–	–
	300 ppm	–	–	–	+	+	+	–	–	–	–	–	–
	400 ppm	–	–	–	+	+	+	–	–	–	–	–	–
1	500 ppm	–	–	–	+	+	+	–	–	–	–	–	–
	1000 ppm	–	–	–	+	+	+	–	–	–	–	–	–
	1500 ppm	–	–	–	+	+	+	–	–	–	–	–	–
	2000 ppm	–	–	–	+	+	+	–	–	–	–	–	–
	2500 ppm	–	–	–	–	–	–	–	–	–	–	–	–
	3000 ppm	–	–	–	–	–	–	–	–	–	–	–	–
	Serichlor-20												
	ClO_2 100 ppm	+	+	+	+	+	+	+	+	+	+	–	–
	200 ppm	+	+	+	+	+	+	+	+	+	–	–	–
	300 ppm	–	–	–	+	+	+	–	–	–	–	–	–
	400 ppm	–	–	–	+	+	+	–	–	–	–	–	–
2	500 ppm	–	–	–	+	+	+	–	–	–	–	–	–
	1000 ppm	–	–	–	+	+	+	–	–	–	–	–	–
	1500 ppm	–	–	–	+	+	+	–	–	–	–	–	–
	2000 ppm	–	–	–	+	+	+	–	–	–	–	–	–
	2500 ppm	–	–	–	–	–	–	–	–	–	–	–	–
	3000 ppm	–	–	–	–	–	–	–	–	–	–	–	–
3	Inoculated control	+	+	+	+	+	+	+	+	+	+	+	+

+ : In effective: – : Effective

Table 3. *In vitro* studies on the germicidal action of Serichlor-60 + slaked lime solution against silkworm pathogens

Sl. no.	Concentration		*In vitro* efficacy					
	ClO_2 (ppm)	Slaked lime (%)	*B . thuringiensis.*			*B. bassiana.*		
			10	20	30	10	20	30
1	300 + 0.3%		+	+	+	–	–	–
2	300 + 0.4%		+	+	+	–	–	–
3	300 + 0.5%		+	+	+	–	–	–
4	300 + 0.6%		+	+	+	–	–	–
5	400 + 0.3%		+	+	+	–	–	–
6	400 + 0.4%		+	+	+	–	–	–
7	400 + 0.5%		+	+	+	–	–	–
8	400 + 0.6%		+	+	+	–	–	–
9	500 + 0.3%		+	+	+	–	–	–
10	500 + 0.4%		+	+	+	–	–	–
11	500 + 0.5%		–	–	–	–	–	–
12	500 + 0.6%		–	–	–	–	–	–
13	600 + 0.3%		+	+	+	–	–	–
14	600 + 0.4%		+	+	+	–	–	–
15	600 + 0.5%		–	–	–	–	–	–
16	600 + 0.6%		–	–	–	–	–	–
17	Inoculated control		+	+	+	+	+	+

+ : In effective; – : Effective

Table 4. *In vitro* studies on the germicidal action of Serichlor-20 +slaked lime solution against silkworm pathogens

Sl. no.	Concentration		*In vitro* efficacy					
	ClO_2 (ppm)	SL (%)	*B. thuringiensis.*			*B. bassiana.*		
			10	20	30	10	20	30
1	300 + 0.3%		+	+	+	–	–	–
2	300 + 0.4%		+	+	+	–	–	–
3	300 + 0.5%		+	+	+	–	–	–
4	300 + 0.6%		+	+	+	–	–	–
5	400 + 0.3%		+	+	+	–	–	–
6	400 + 0.4%		+	+	+	–	–	–
7	400 + 0.5%		+	+	+	–	–	–
8	400 + 0.6%		+	+	+	–	–	–
9	500 + 0.3%		+	+	+	–	–	–
10	500 + 0.4%		+	+	+	–	–	–
11	500 + 0.5%		–	–	–	–	–	–
12	500 + 0.6%		–	–	–	–	–	–
13	600 + 0.3%		+	+	+	–	–	–
14	600 + 0.4%		+	+	+	–	–	–
15	600 + 0.5%		–	–	–	–	–	–
16	600 + 0.6%		–	–	–	–	–	–
17	Inoculated control		+	+	+	+	+	+

+ : In effective: – : Effective

Table 5. *In vivo* studies on the germicidal action of Serichlor-60 + slaked lime solution against the pathogens of silkworm

Sl. no.	Concentration		Efficacy against silkworm pathogens in different durations of treatment (min.)											
	ClO_2 (ppm)	SL (%)	*N. b*			BmNPV			*B. t.*			*B. b.*		
			10	20	30	10	20	30	10	20	30	10	20	30
1	300 + 0.3%		+	+	+	+	+	+	+	+	+	–	–	–
2	300 + 0.4%		+	+	+	+	+	+	+	+	+	–	–	–
3	300 + 0.5%		+	+	+	+	+	+	+	+	+	–	–	–
4	300 + 0.6%		+	+	+	+	+	+	+	+	+	–	–	–
5	400 + 0.3%		+	+	+	+	+	+	+	+	+	–	–	–
6	400 + 0.4%		+	+	+	+	+	+	+	+	+	–	–	–
7	400 + 0.5%		+	+	+	+	+	+	+	+	+	–	–	–
8	400 + 0.6%		+	+	+	+	+	+	+	+	+	–	–	–
9	500 + 0.3%		+	+	+	+	+	+	+	+	+	–	–	–
10	500 + 0.4%		+	+	+	+	+	+	+	+	+	–	–	–
11	500 + 0.5%		–	–	–	–	–	–	–	–	–	–	–	–
12	500 + 0.6%		–	–	–	–	–	–	–	–	–	–	–	–
13	600 + 0.3%		+	+	+	+	+	+	+	+	+	–	–	–
14	600 + 0.4%		+	+	+	+	+	+	+	+	+	–	–	–
15	600 + 0.5%		–	–	–	–	–	–	–	–	–	–	–	–
16	600 + 0.6%		–	–	–	–	–	–	–	–	–	–	–	–
17	Inoculated control		+	+	+	+	+	+	+	+	+	+	+	+

+ : In effective; – : Effective

Table 6. *In vivo* studies on the germicidal action of Serichlor-20 + slaked lime solution against the pathogens of silkworm

Sl. no.	Concentration		Efficacy against silkworm pathogens in different durations of treatment (min.)											
	ClO_2 (ppm)	SL (%)	*N. b*			BmNPV			*B. t.*			*B. b.*		
			10	20	30	10	20	30	10	20	30	10	20	30
1	300 + 0.3%		+	+	+	+	+	+	+	+	+	–	–	–
2	300 + 0.4%		+	+	+	+	+	+	+	+	+	–	–	–
3	300 + 0.5%		+	+	+	+	+	+	+	+	+	–	–	–
4	300 + 0.6%		+	+	+	+	+	+	+	+	+	–	–	–
5	400 + 0.3%		+	+	+	+	+	+	+	+	+	–	–	–
6	400 + 0.4%		+	+	+	+	+	+	+	+	+	–	–	–
7	400 + 0.5%		+	+	+	+	+	+	+	+	+	–	–	–
8	400 + 0.6%		+	+	+	+	+	+	+	+	+	–	–	–
9	500 + 0.3%		+	+	+	+	+	+	+	+	+	–	–	–
10	500 + 0.4%		+	+	+	+	+	+	+	+	+	–	–	–
11	500 + 0.5%		–	–	–	–	–	–	–	–	–	–	–	–
12	500 + 0.6%		–	–	–	–	–	–	–	–	–	–	–	–
13	600 + 0.3%		+	+	+	+	+	+	+	+	+	–	–	–
14	600 + 0.4%		+	+	+	+	+	+	+	+	+	–	–	–
15	600 + 0.5%		–	–	–	–	–	–	–	–	–	–	–	–
16	600 + 0.6%		–	–	–	–	–	–	–	–	–	–	–	–
17	Inoculated control		+	+	+	+	+	+	+	+	+	+	+	+

+ : In effective; – : Effective

ppm ClO_2 in 0.5% slaked lime solution in disinfecting the contaminated rearing house. All the pathogens exposed to disinfection in the rearing house were found killed and no incidence of pebrine, grasserie bacterial flacherie and muscardine were recorded in silkworms. The disinfectant was effective at a minimum treatment duration of 30 min to 24 hrs.

The above concentration was also found effective in disinfection of contaminated rearing trays and silkworm eggs. The larvae reared in the contaminated trays that were disinfected with 500 ppm ClO_2 in 0.5% slaked lime solution did not cause infection in silkworm and diseases *viz.*, pebrine, grasserie, bacterial flacherie and muscardine. In the case of trays contaminated and not disinfected, there was a record of the incidence of respective disease during the rearing. The disinfectant was also effective as egg surface disinfection and to kills the egg surface pathogens.

Discussion

There are many disinfectants reported to be effective against silkworm pathogens. However, a few of them are only in practical use with several constraints associated with their use. Formalin is effective in a separate and closed rearing house under high humid condition. Though Bleaching powder is suitable to all types of rearing houses but it is least stable and highly corrosive disinfectant in nature. In countries with poor infrastructure facilities for silkworm rearing as in India, disinfection with the most suitable disinfectant is essential to prevent loss due to the diseases. Recently Balavenkatasubbaiah *et al.* (1999) found Sanitech containing chlorine dioxide is the most suitable disinfectant in sericulture.

The present study results clearly indicated that Serichlor containing chlorine dioxide is effective against all the

Table 7. Efficacy of 500 ppm ClO_2 (Serichlor-60/ Serichlor-20) + 0.5% slaked lime solution in disinfection of silkworm rearing house and appliances

Treatment	Rearing house				Rearing trays			
	N. b.	*B. t.*	*B. b.*	BmNPV	*N. b.*	*B. t.*	*B. b.*	BmNPV
Serichlor-60								
30 min	–	–	–	–	–	–	–	–
1 hr	–	–	–	–	–	–	–	–
3 hrs	–	–	–	–	–	–	–	–
6 hrs	–	–	–	–	–	–	–	–
12 hrs	–	–	–	–	–	–	–	–
24 hrs	–	–	–	–	–	–	–	–
Serichlor-20								
30 min	–	–	–	–	–	–	–	–
1 hr	–	–	–	–	–	–	–	–
3 hrs	–	–	–	–	–	–	–	–
6 hrs	–	–	–	–	–	–	–	–
12 hrs	–	–	–	–	–	–	–	–
24 hrs	–	–	–	–	–	–	–	–
Inoc. control (No disinfection)	+	+	+	+	+	+	+	+

Table 8. Efficacy of Serichlor-60/Serichlor-20 (500 ppm ClO_2) in 0.5% slaked lime solution as surface disinfectant of silkworm eggs

Sl. no.	Treatment	Efficacy against the pathogens			
		N. b.	*B. t.*	*B. b.*	NPV
1	**Serichlor-60** 500 ppm ClO_2 + 0.5 % slaked lime	–	–	–	–
2	**Serichlor-20** 500 ppm ClO_2 + 0.5 % slaked lime	–	–	–	–
3	Inoculated control	+	+	+	+

common silkworm pathogens. It is disinfectant suitable and effective for disinfection of rearing house, appliances and silkworm egg surface. Chlorine dioxide as gas was known for years as most powerful anti-microbial agent and its advantage as a hard surface disinfectant was widely recognized. Chlorine dioxide is a yellow to green coloured gas with a distinct odour similar to that of chlorine. As gas, chlorine dioxide is highly toxic and very unstable. Chlorine dioxide gas have been stabilized in solution form by a specific patented process. Unlike chlorine, it do not disassociate or react with water. Stabilized chlorine dioxide is superior disinfectant than chlorine in many aspects. It is stable, 2.5 times more effective than chorine (Ingols and Ridenour, 1948) and twice stronger than sodium hypochlorite. Compared with chlorination with sodium hypochlorite, chlorine dioxide has several advantages. Chlorine dioxide as a gas is a biotoxic oxidant, causing membrane damage. However, stabilized chlorine dioxide reacts with nucleotides cysteine, tyrosine and tryptophane moieties in the viral protein (Noss and Olivieri, 1985).

Serichlor, the stabilized chlorine dioxide has low toxicity and is effective even at broad pH ranges. It is non hazardous to human and domestic animals. It do not form chlorinated organic by-products as well as carcinogenic trihalomethanes as does chlorine, bad tasting chlorophenols or chloramines as does Cl_2. It is not known to act as a toxin to microbial pathogen and as such the microbial resistance is not expected to develop. Unlike ozone, it is also known to provide residual protection. It is stable and may be activated at the time of its use. It possesses tolerable odour and comparatively very low corrosiveness. At the suggested concentration, serichlor (500 ppm chlorine dioxide + slaked lime solution) was found less corrosive than bleaching powder (30% chlorine) of 2% in 0.3% slaked lime solution. The solution do not affect wood and cloth. Chlorine dioxide is not affected by pH or ammonia; and requires only short treatment duration and thus has less effect on system operations. Stabilized chlorine dioxide can be stored, transported and used without any special consideration. Regulatory approval have been accorded to stabilized chlorine dioxide by food drug administration, USA, Environment protection agency, USA, and united states drug administration, USA for several applications including disinfection and de oderisation of animal confinement (1000 ppm), treatment of stored potable drinking water (5 ppm), treatment of all food contact surfaces (200 ppm) and terminal sensitizing rinse, not requiring water flush of all food contact surfaces in food processing plants (100 ppm). As Serichlor-60 (60,000 ppm chlorine dioxide) and Serichlor-20 (20,000 ppm chlorine dioxide) are equally effective at 500 ppm chlorine dioxide in 0.5% slaked lime, any one of these products can be used in sericulture more particularly in countries like India where rearing cum dwelling houses are still common.

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