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EFFICACY OF CALCIUM HYDROXIDE AGAINST NUCLEAR POLYHEDROSIS VIRUS OF SILKWORM, *Bombyx mori*

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ABSTRACT

Laboratory experiments were conducted to study the efficacy of calcium hydroxide against nuclear polyphedrosis virus (NPV) disease of silkworm, *Bombyx mori* L. Feeding the larvae with calcium hydroxide at 100 ppm treated mulberry leaves once during the third instar of *B.mori* was effective against NPV. Calcium hydroxide treatment did not produce any deleterious effect on the larval and cocoon parameters of *B.mori*.

KEY WORDS : *Bombyx mori*, Calcium hydroxide, NPV, Mulberry

Silkworm, *Bombyx mori* L. is more prone to different types of infectious disease. Among them, grasserie caused by nuclear polyhedrosis virus (NPV) accounts for more than 15 per cent loss in cocoon yield (Vaidya, 1960). To control the disease, formalin (2%) disinfection is widely recommended. (Nango, 1972; Krishnaswami *et al.*, 1973; Samson, 1985; Seki, 1986). But use of formalin is likely to phased out slowly because of its carcinogenic nature to vertebrates

Therefore, identification of selective chemicals for managing NPV without adversely affecting silkworm is necessary. The present paper reports the laboratory investigations on the efficacy of calcium hydroxide against NPV of silkworm.

MATERIALS AND METHODS

The NPV was isolated from the fifth instar *B.mori* larvae showing the gross pathological symptoms. The virus was collected before the death of larvae in order to minimise the contamination and enhance purity of virus. The prolegs of diseased worms were excised to collect the haemolymph. The haemolymph from the same diseased larvae was passed through a double layer of muslin cloth to remove the debris. The suspension was then centrifuged at 500 rpm for about one min to remove the crude tissue debris and the supernatant was collected.

The supernatant was centrifuged at 3000 rpm for three min and a sediment containing the polyhedral occlusion bodies (POB) was obtained. The pellet was washed thrice in distilled water and finally suspended in distilled water. The POB suspension was stored at - 10^{0}C in freezer. The strength of POB was assessed using a Naubaeur haemocytometer (FEINOPTIK blanken burg). Calcium hydroxide (Sarabhai Chemicals Ltd). at different concentrations *viz.*, 0, 12.5, 25.0, 50.0, 75.0 and 100 ppm was prepared in distilled water containing 0.1 per cent teepol. Mulberry leaves were dipped in these suspensions and shade dried. Third instar larvae of *B.mori* ($PMXNB_4D_2$) were orally inoculated with active virus @ 100 POB/larva by using a microsyringe applicator (0.2µ l). The leaves treated with different concentrations were fed once during third instar, third, fourth instar, third, fourth and fifth instar. An absolute control fed with untreated leaves and without vir inoculation was also maintained. After Ab correction (Abbott, 1925), the actual mo al to grasserie was computed by ake consideration the mortality due r the hydroxide in larvae not inoculated top a

Table 1. Effect of calcium hydroxide on grasserie in silkworm

Treatment (ppm)	% NPV mortality when Calcium hydroxide was fed during instar*						Mean % NPV mortality
	III		III, IV		III, IV & V		
	Computed % NPV mortality	% reduction	Computed % NPV mortality	% reduction	Computed % NPV mortality	% reduction	
100 POB/L	51.49 (45.86)	-	52.71 (46.55)	-	49.95 (44.97)	-	51.38 (45.79)
100 POB/L + 12.5 CaOH	37.71 (37.72)	17.14	27.70 (31.26)	32.84	27.70 (31.64)	29.64	31.03 (33.54)
100 POB/L + 25.0 CaOH	35.49 (36.32)	20.80	27.70 (31.26)	32.84	27.70 (31.64)	29.64	29.96 (33.07)
100 POB/L + 50.0 CaOH	24.17 (25.94)	43.43	19.37 (25.91)	44.33	15.10 (22.82)	49.25	21.89 (24.89)
100 POB/L + 75.0 CaOH	16.42 (20.61)	55.05	12.48 (20.01)	57.01	16.40 (20.61)	54.19	14.40 (20.41)
100 POB/L + 100.0 CaOH	6.52 (10.64)	59.35	8.30 (16.73)	64.06	5.90 (14.01)	68.84	9.14 (12.46)
Mean	29.30 (30.01)		25.17 (27.62)		24.60 (28.01)		
Stages							NS
Treatment							(7.86)
Interaction							NS

* Abbott's correction for mortality due to calcium hydroxide
Figures in parantheses are arcsin √percentage

Besides larval mortality, the larval and cocoon parameters were recorded and analysed statistically using factorial completely randomised design.

RESULTS AND DISCUSSION

The results on the frequency of feeding with calcium hydroxide and per cent mortality due to NPV showed that there were no significant differences between feeding once during third or twice during third and fourth or thrice during third, fourth and fifth instar stages (Table 1). It was also observed that higher doses of calcium hydroxide (100 ppm) was more effective than at lower doses for all the stages of silkworm.

Feeding silkworm larvae with calcium hydroxide did not produce any deleterious effect on *B.mori* in terms of larval and cocoon parameters. On the contrary, all the parameters were enhanced significantly but marginally due to calcium hydroxide treatment particularly at concentrations of 25 ppm and above (Table 2)

It is known that ployhedra dissolution in the midgut of silkworm larva is achieved by alkaline conditions as well as proteases. However , extreme levels of pH would inactive the NPV (Ignoffo and Garcia, 1966). In the present study, feeding silkworm larvae with calcium hydroxide treated

Table 2. Effect of calcium hydroxide on mean larval weight, cocoon weight, shell weight and silk filament length in silkworm

Treatment	Larval weight (g)		Cocoon weight (g)		Shell weight (g)		Silk filament length (m)	
	Calcium OH	Calcium OH + NPV*	Calcium OH	Calcium OH + NPV*	Calcium OH	Calcium OH + NPV*	Calcium OH	Calcium OH + NPV*
100 POB/L	3.18[d]	3.05[d]	1.37[c]	1.12[d]	0.266[b]	0.215[e]	677[d]	579[c]
100 POB/L + 12.5 CaOH	3.28[c]	3.05[d]	1.38[c]	1.24[c]	0.266[b]	0.220[de]	671[d]	569[c]
100 POB/L + 25.0 CaOH	3.34[bc]	3.17[c]	1.44[bc]	1.21[c]	0.276[b]	0.227[d]	718[c]	577[c]
100 POB/L + 50.0 CaOH	3.38[d]	3.25[b]	1.48[b]	1.24[c]	0.294[a]	0.270[c]	760[b]	637[b]
100 POB/L + 75.0 CaOH	3.54[a]	3.31[a]	1.61[a]	1.44[b]	0.303[a]	0.284[b]	784[a]	685[a]
100 POB/L + 100 CaOH	3.61[a]	3.36[a]	1.66[a]	1.53[a]	0.303[a]	0.297[a]	787[a]	676[a]
Mean	3.39	3.20	1.49	1.31	0.284	0.252	738	616

* BmNPV 100POB/larva
Means followed by similar letters are not different statistically (P = 0.05) by L.S.D.

leaves must probably have elevated the gut pH beyond the favourable range resulting in inactivation of the released virions.

Yoshimitsu and Zhou (1988) also observed that the virions become inactivated when the NPV were treated with a saturated solution of calcium hydroxide and when the solution containing the inactivated virions was administered through per os into the healthy silkworms, no infection of the the larvae was observed. Patil (1991) also observed similar inactivation of polyhedra of cytoplasmic polyhedrosis virus (CPV) when treated with calcium hydroxide. From the studies, it may be concluded that leaf treatment with calcium hydroxide at 100 ppm fed once during the third instar reduces the grasserie disease.

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EFFECT OF IRRIGATION REGIMES, COMRADE CROPPING AND SOIL AMENDMENTS ON BIOCHEMICAL ANALYSIS, N, P AND K UPTAKE AND YIELD OF CASSAVA AND GROUNDNUT

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ABSTRACT

Irrigation at 0.6 IW/CPE ratio recorded higher yield of tuber in cassava and pod and haulm in groundnut. Among the combinations, cassava raised as sole crop or as comrade cropping in groundnut recorded comparable yields. Coir waste applied @ 10 t. ha^{-1} increased the cassava tuber and groundnut pod yields. The quality of cassava tuber such as starch and total sugar contents increased and HCN content decreased as the moisture level increased. Nutrient up take was the highest under higher moisture regimes. Cassava raised as comrade cropping in groundnut registered maximum uptake of N, P and K. Application of coir waste @ 10 t.ha^{-1} increased the quality characters and total uptake of nutrients by the plants.

KEY WORDS : Irrigation, Comrade Cropping, Cassava, Groundnut, Yield, Nutrient Uptake.

In India cassava is cultivated in an area of 3.08 lakh ha in Kerala and Tamil Nadu with an annual production of 56 million tonnes. It is cultivated in about 0.48 lakh ha in Tamil Nadu with a production of 1.5 million tonnes of tuber annually contributing about 42 per cent of the national production. Even with the higher contribution to the national cassava production, the productivity (10.25 tonnes ha^{-1}) is far below the normal productivity (19.33 tonnes ha^{-1} (FAO, 1988) as well as the maximum (40 tonnes ha^{-1}) potential productivity. Inadequate provision of inputs like water and nutrients are the probable reasons for the low productivity. Any attempt to develop a