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Research Note

Influence of water quality on efficacy of *Bacillus thuringiensis* var. *kurstaki* used as a spray fluid

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ABSTRACT

The effect of quality of water on *Btk* formulation was studied at Junagadh Agriculture University, Junagadh, Gujarat. The influence of water quality on efficacy of *Btk* used as spray fluid revealed that water pH affected the efficacy of *Btk* formulation. The water with pH 7.0 to 8.5 was the most favourable for the efficacy of *Btk*. whereas, distilled water was more effective than tap water.

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The *Bacillus thuringiensis* var. *kurstaki* (*Btk.*) is being used all over India for the control of different crop pests. It is now a day's very popular bio pesticide available in market that has been exploited and showed very good effect as compared to chemical insecticides. The water used by the farming community of the country for the preparation of the *Btk.*. suspension is whatever available in the vicinity of the field. The available water is of different quality in the different regions as well as in different seasons. It is well known fact that the commercial formulations of *Btk.* available in market are d endotoxin based and the toxin is very well affected by pH. This indicated that there would be some effect of pH of the water that is used to prepare spray fluid on the *Btk.* formulation. The present experiment was conducted to study the influence of quality of water on *Btk.* formulation.

The present investigation was carried out to study the influence of quality of water that is used as a spray fluid on the efficacy of *Btk.* at Department of Agril. Entomology, Junagadh Agriculture University, Junagadh under laboaratory conditions.

In order to know the influence of water quality on effectiveness of *Btk.*, different categories of water *viz.*, pH 6.0, 7.0, 7.5, 8.0, 8.5, 9.0, tap water and distilled water were studied. The experiment was conducted in C.R.D with four replications. The different quality of water having different pH was prepared. The *Btk.* formulation @ 1.5 g/l was mixed in the water that is having different pH. In bioassay, okra fruits were cut into slices with the help of knife. These slices were immersed in a suspension of *Btk.*, having different quality of water for 30 seconds and the excess fluid was removed by uniform jerking. These treated okra slices were air dried for a half hour. The treated okra fruit slices were placed separately inside the Petridishes (15 cm diameter x 2.5 cm height) over moist blotting paper. A single 24-hour starved third instar larva was released on each slice. For each treatment, ten larvae were used. The larvae were allowed to feed on the treated fruit slice for 24 hours and then fresh, untreated okra fruit slices were provided daily to the larvae for feeding. Mortality counts were taken at 1, 2, 3 and 4 days after exposure. The larval mortality was converted into percent larval mortality.

The results pertaining to laboratory experiment on influence of water quality on toxicity of *Btk.* against third instar larvae of *E. vittella* are presented in Table 1.

There was no any larval mortality observed one day after feeding. After two days of feeding, the larval mortality of 40.00 to 45.00 per cent was observed in all the treatments but there was no significant difference among the treatments.

The highest larval mortality (75.00 %) was observed in the treatment with distilled water and was found to be best treatment. This was followed by pH 7.0, 7.5 and 8.0, which recorded 70.00, 67.50 and 67.50 per cent, larval mortality, respectively and was at par with above treatment. The

Table 1 : Influence of water quality on toxicity of *Bacillus thuringiensis* var *kurstaki* against *Earias vittella*

Treatments	Larval mortality (%) days after feeding			
	1	2	3	4
pH 6.00	9.10* (0.00)	39.23 (40.00)	50.83 (60.00)	61.77 (77.50)
pH 7.00	9.10 (0.00)	40.67 (42.50)	55.44 (70.00)	71.87 (89.38)
pH 7.50	9.10 (0.00)	40.67 (42.50)	55.28 (67.50)	71.87 (89.38)
pH 8.00	9.10 (0.00)	40.67 (42.50)	55.28 (67.50)	69.53 (87.50)
pH 8.50	9.10 (0.00)	40.67 (42.50)	52.27 (62.50)	67.50 (85.00)
pH 9.00	9.10 (0.00)	40.67 (42.50)	52.27 (62.50)	63.44 (80.00)
Tap water	9.10 (0.00)	40.67 (42.50)	53.78 (65.00)	63.44 (80.00)
Distilled water	9.10 (0.00)	42.12 (45.00)	60.11 (75.00)	74.20 (91.25)
SEm. ±	-	1.38	1.96	2.85
C.D. at 5 %	-	NS	5.72	8.30

* Arcsin $\sqrt{\text{percentage transformation}}$
Figures in parentheses are original values NS=Non-significant

remaining treatments were at par with each other and found less effective after three days of feeding.

After four days of feeding, the highest mortality (91.25 %) was observed in distilled water. It was at par with pH 7.0, 7.5, 8.0 and 8.5, which recorded 89.38, 89.38, 87.50 and 85.00 per cent larval, mortality, respectively and were found best treatments. The remaining treatments recorded 80.00 to 77.50 per cent larval mortality and were less effective as compared to other treatments. This revealed that the pH of water is responsible for the effectiveness of *Btk.* formulation. The water having pH 7.0 to 8.5 can be used for the preparation of *Btk.* formulation. The water having pH more than 8.5 cannot be used for the preparation of spray fluid.

From the above results it can be concluded that water pH affected the efficacy of *Btk.* formulation. The water with pH 7.0 to 8.5 was the most favourable water for preparation of spray suspension for better efficacy of *Btk.*.

Earlier, Lee and Cheong (1985) observed that the potency of *Bt* was reduced in alkaline pH of 10. Floore *et al.* (1987) reported that the efficacy of *Bt* was not affected in water having pH values of 6.3, 7.0 and 8.6. Trumble (1991) reported that *Bt* was found highly effective at pH between 3.5 and 9.5, but at pH 10.5 its efficacy was drastically reduced. Thus, the present investigation is in agreement with the reports made by earlier workers.

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