Short Communication

**FIELD ASSESSMENT OF B-2 AS A NEW MOLLUSCICIDE FOR
THE CONTROL OF *ONCOMELANIA NOSOPHORA***

NORIAKI KAJIHARA, TOSHIMASA HORIMI, MASARU MINAI
and YUKIO HOSAKA*

Yamanashi Prefectural Institute for Public Health, Kofu-shi, Yamanashi 400,
*and *Department of Parasitology, National Institute of Health,*
Kamiosaki, Shinagawa-ku, Tokyo 141

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SUMMARY: Sodium 2,5-dichloro-4-bromophenol named B-2 was evaluated for application in the field as a molluscicide against *Oncomelania nosophora*. A dosage of 10 g/m² as 25% liquid form or 25 g/m² as 10% granular form of B-2 was suggested as a standard dose for the control of *O. nosophora*. The residual concentration of B-2 in the soil after application was observed to decrease more rapidly than did that of NaPCP. The residual level of B-2 in the rice grains harvested from the paddy field in which the chemical was applied at most 4 times during the planting season did not exceed 0.03 ppm.

Laboratory experiments of the molluscicidal activity of 2,5-dichloro-4-bromophenol named B-2 have previously been reported by the present authors (Kajihara et al., 1979). The results indicated its promising cidal effect against *Oncomelania nosophora* as well as its rather low toxicity to fish and mammals. Toxicity of B-2 to fish has also been reported by Hirose and Yasuno (1979); among three molluscicides (B-2, Niclosamide and Yurimin) tested, B-2 showed a toxicity lower than those of the others against the juvenile of guppy, *Poecilia reticulata*. The present paper deals with field trials of B-2 on *Oncomelania nosophora*. The amount of residue of the chemical in the soil and agricultural products were also checked.

B-2 in either 25% liquid form or 10% granular form was applied in each of quadrates of 5 m² set in the habitat of *O. nosophora* in Yamanashi Prefecture with plastic flames of about 20 cm in height. The chemical in liquid form was sprayed by a handy sprinkler in each quadrate at a dosage of 5 g, 10 g or 20 g/m². The chemical in granular form at a dosage of 10 g or 25 g/m² was spread by hand as evenly as possible. Post-treatment samplings of the snail were made on 1, 2, 3 and 4 weeks after application of the chemical.

梶原徳昭・堀見利昌・薬袋 勝 (山梨県立衛生公害研究所 甲府市富士見 1-7-31)
保阪幸男 (国立予防衛生研究所 寄生虫部)

TABLE I

Results of field trials with B-2 against Oncomelania nosophora

Form of the chemical	Dose (g/m ²)	Mortality of snails after application of chemical							
		1st week Number of snails dead/ examined	%	2nd week Number of snails dead/ examined	%	3rd week Number of snails dead/ examined	%	4th week Number of snails dead/ examined	%
25% liquid form	5 g	38/53	71.7	66/100	66.0	ND		106/170	62.4
	10 g	90/95	94.7	137/142	96.5	78/ 79	98.7	107/109	98.2
	20 g	86/88	97.7	72/ 75	96.0	64/ 66	87.0	91/ 93	97.8
10% granular form	10 g	30/68	44.1	135/151	89.4	127/181	70.2	21/ 45	46.7
	25 g	78/80	97.5	76/ 78	97.4	87/ 91	95.6	88/104	84.6
	0 (control)	3/87	3.4	9/106	8.5	3/104	2.9	4/ 84	4.8

ND: Not done.

The results are shown in Table I. The treatment with a dose of 10 or 20 g/m² of 25% liquid form of B-2 gave a mortality rate higher than 90% even 4 weeks after the application. The dose of 25 g/m² of 10% granular form resulted in a mortality higher than 80%. For the practical use of B-2 in control of *O. nosophora*, therefore, a dose of 10 g/m² as 25% liquid form or a dose of 25 g/m² as 10% granular form would be suitable.

The dose of 5 g/m² NaPCP has been used as a standard dose for molluscicidal application in the endemic area of schistosomiasis in Japan. Komiya *et al.* (1962) reported that the dosage of 1 g/m² of Niclosamide should be adopted for a standard molluscicidal dose for control of *O. nosophora*. To obtain the same level of molluscicidal effect as that of 5 g/m² of NaPCP or 1 g/m² of Niclosamide, the dose of 2.5 g/m² of B-2 based on the active ingredient should be adopted as a standard dose for control of *O. nosophora*.

To determine the residue of B-2 in the soil, the chemical in 10% granular form was applied twice or 4 times in two test stations (A and B) selected in paddy-field in an endemic area of schistosomiasis in Yamanashi Prefecture. A dose of 25 g/m² of the chemical was spread twice at an interval of 10 weeks in the A station. The same dose of the chemical was applied in the B station twice at an interval of 1 week and, after 8 weeks, twice more at an interval of 3 weeks. Samples of the soil were taken 1, 7, 13, 24, 56 and 110 days after the last application of the chemical. All the samples were extracted with ether and the B-2 extracts were subjected to gas chromatography.

Concentrations of B-2 in the samples are shown in Table II. The residual level of B-2 in the soil decreased by about 90% of the initial concentrations within 24 days after the application and a half-life period of the chemical in the soil was estimated to be about 8 days in the A station about 14 days in the B station.

TABLE II

Residues of B-2 in the soil of paddy-field*

Test station	Dose of chemical and times applied	Concentration of B-2 on day after the last application (ppm)						
		0	1	7	13	24	56	110
A	25 g/m ² , twice	6.42	5.82	3.20	0.16	0.52	0.25	ND
B	25 g/m ² , 4 times	6.06	5.27	3.77	3.46	0.36	0.32	0.08

* 10% granular form of B-2 was used.

ND: Not done.

TABLE III

Residues of B-2 in rice grain and rice straw*

Test station	Dose of chemical and times applied	Unpolished rice	Polished rice	Rice straw
C	25 g/m ² , twice	0.026 ppm	<0.005 ppm	0.84 ppm
D	25 g/m ² , 4 times	0.030 ppm	0.005 ppm	2.69 ppm
E	0 (control)	<0.005 ppm	ND	<0.005 ppm

* 10% granular form of B-2 was used.

ND: Not done.

Nose (1978) reported that the half-life periods of NaPCP in the soil were 26 days and 91 days when the initial concentrations were 43 ppm and 13 ppm, respectively. In Japan, the use of NaPCP has been forbidden by the government regulation to avoid environmental pollution. In this regard, B-2 may be advantageous since the residual B-2 in the soil after application decreases more rapidly than does that of NaPCP.

To determine residues of B-2 in agricultural products, three stations (C, D and E) of rice paddy-field in an endemic area of schistosomiasis were selected. Rice grain and rice straw were sampled for the measurement. A dose of 25 g/m² of 10% granular form of B-2 was spread twice at an interval of 10 weeks in the C station. The same dose of the chemical was applied in the D station twice at an interval of 1 week and then, after 7 weeks, twice more at an interval of 4 weeks according to the schedule of practical mollusciciding application and rice planting. The E station received no chemical. The rice grain and the rice straw were harvested 5 weeks (D station) and 7 weeks (C station) after the last application of the chemical. A portion of the rice-grain sample was polished. All the samples were extracted with methyl alcohol to determine B-2 by gas chromatography.

Table III shows residual levels of B-2 in the samples. Although residual B-2 in unpolished rice was about 0.03 ppm, that in polished rice was negligible, being 0.005 ppm or lower concentrations. According to Notification of Ministry of Health and Welfare (Ministry of Health and Welfare, 1959), the tolerable residual levels of organic chlorine compounds such as BHC and DDT in

unpolished rice have been set at 0.2 ppm or below. B-2 is not listed in Notification as yet, but it is noteworthy that its residues in unpolished rice are far below the tolerable residual levels of BHC and DDT as mentioned above. However, rather high levels of residual B-2 were observed in rice straw. Adequate precautions should be taken in feeding rice straw to domestic animals or in other use. It is suggested that B-2 can be applied as a molluscicide at most 4 times during the planting season in the rice paddy-field without causing any serious disadvantages on the products.

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