

chalkone did not contain any methoxyl group (micro ziesel). It was found to be identical with the one obtained from eriodictyol (co-chromatography) proving it to be 3,4,2',4',6'-pentahydroxy chalkone (III).

According to Narasimhachari and Seshadri eriodictyol when treated with 10% aqueous potash and kept at room temperature for  $\frac{1}{2}$  hr. and acidified in the cold was recovered unchanged. We have used 20% aqueous alkali and 12 hrs.; on chromatography the product showed one weak yellow spot and another one which developed yellow colour (major portion) on exposure to ammonia. When Shimokoriyama's method,<sup>7</sup> boiling with aqueous potash (0.5 g. in 1 ml. of water) for 2 mts. is adopted the crude product showed a single yellow spot and a very faint spot due to some eriodictyol. The chalkone had a melting point of 140–42°; usually the melting point of a chalkone is about 10° lower than the corresponding flavanone; eriodictyol melts at about 267°. The lower melting point of the chalkone may be due to rapid isomerisation. It is highly unstable in presence of acids and also to heat and yields eriodictyol when boiled with alcoholic hydrochloric acid.

On methylation with dimethyl sulphate and potassium carbonate in acetone (10 hr.) it gave a tetramethyl ether, m.p. 146–47°, which gave a

positive ferric reaction, and has been found to be identical with synthetic 2'-hydroxy-3,4,4',6'-tetramethoxy chalkone (IV). The identity was proved by T.L.C. and mixed melting point. The n.m.r. spectrum of the methyl ether was taken in  $\text{CDCl}_3$  using tetramethyl silane as the internal standard and the signals are given below:  $-4.45\tau$  (2'-Hydroxy proton);  $2.28\tau$  (olefinic protons);  $3.2$  to  $2.7\tau$  (3 aromatic protons of A ring at 2, 5 and 6);  $4.03$  and  $3.87\tau$  (two meta coupled protons at 3' and 5';  $J = 3 \text{ CpS}$ ) and  $6.17$  and  $6.09\tau$  (12 protons of the methoxyls at 3, 4, 4', 6').

1. Narasimhachari, N. and Seshadri, T. R., *Proc. Ind. Acad. Sci.*, 1948, **27 A**, 223; *Ibid.*, 1949, **30 A**, 271.
2. Puri, B. and Seshadri, T. R., *J. Sci. Ind. Res.*, (India), 1954, **13 B**, 698.
3. Charaux, C. and Rabate, J., *Bull. Soc. Chim. boil.*, 1931, **13**, 814.
4. Parthasarathy, M. R. and Seshadri, T. R., *Curr. Sci.*, 1961, **30**, 333.
5. Seshadri, T. R. and Thakur, R. S., *Ibid.*, 1960, **29**, 57.
6. Orth, W. A. and Riedl, W., *Ann.*, 1963, **663**, 74.
7. Shimokoriyama, M., *J. Am. Chem. Soc.*, 1957, **79**, 4199.
8. Nilson, M., *Acta Chim. Scand.*, 1961, **15**, 211.
9. Farkas, L., Nogradi, M. and Major, A., *Chem. Ber.*, 1955, **98**, 2926.
10. Rimpler, Von. H., Langhammer, L. and Frenzel, H. J., *Planta Medica*, 1963, **3**, 325.

## EFFECT OF CHLORINATION OF WATER ON CONTROL OF BACTERIAL LEAF BLIGHT OF RICE, CAUSED BY *XANTHOMONAS ORYZAE* (UYEDA AND ISHIYAMA) DOWSON

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RECENTLY, Thompson<sup>1</sup> reported that spread of bacterial stalk rot of corn could be checked by chlorination of water in sprinkler irrigation to give a concentration of 1 ppm residual chlorine. Our attention was drawn to these results by Dr. B. L. Renfro of the Rockefeller Foundation, New Delhi, with the suggestion that this method could be given a trial for the control of bacterial blight of rice. Since infection of *Xanthomonas oryzae* spreads rapidly through irrigation water (Inoue et al.,<sup>2</sup> Tagami et al.<sup>3</sup>) it was thought worthwhile to conduct a field trial to study the effect of chlorination of water on control of bacterial blight. The results of the field trial conducted at the Central Rice

Research Institute Farm, Cuttack, during Kharif, 1966 are discussed below:

The chlorine application was tried on large plots of the varieties Taichung Native-1 and IR-48 (Taichung Native-1  $\times$  Taichung-65), the high-yielding varieties which are very susceptible to bacterial blight. There were 3 plots of 50 cents of each of the two varieties covering a total area of 3 acres.

The treatments included were: (i) Application of chlorine at 1 ppm in the form of bleaching powder containing 30% chlorine (2 kg./ha.), (ii) Application of 5 sprayings with antibiotic (Streptocycline) + copper oxychloride (3 gm. antibiotic + 113 gm. of copper oxychloride in

25 gallons of water), first at the seedling stage 15 days after germination, and the remaining four at 10-day intervals, beginning from 60 days after germination, (iii) Control (no treatment).

Bleaching powder was thoroughly mixed with powdered dry soil and sprinkled uniformly in small quantities by hand to the standing water which was 5-6 cm. high. This treatment was carried out only once on August 24, 1966 when the crop was 74 days old.

The first spraying with Streptocycline + Cu was carried on June 28 in the seed-bed. This was followed by four subsequent sprayings of the crop on August 12 and 23, September 6 and 16, 1966.

Bacterial blight of rice generally starts in distinct patches covering a few plants and spreads rapidly therefrom. The disease was first noticed on August 30 occurring in a few patches in *Taichung Native-1* and in *IR-48*. The incidence of the disease was estimated twice during the season, on September 9 and 10 and again on September 24 and 25, 1966. The disease was estimated by counting the number of disease pockets in each of the 6 individual plots. The total number of blight-affected plants in each pocket was also found. Finally, the total number of infected plants in each treatment was worked out. The data obtained are set out in Table I.

It might be seen from Table I that the number of foci of infection and the total infected plants were significantly less in the plots treated with chlorine as compared to the control (untreated plots). Besides, the rate of spread of infection was most rapid in the control plots. Spraying with Streptocycline + Cu was found to be almost as effective as chlorination of water in checking the spread of the disease. But chlorination of water is economical since the cost of bleaching powder used was Rs. 1.25 per acre as against Rs. 17.00 involved in case of treatment with antibiotic and copper fungicide.

Further, it was found that *IR-48* was completely free from infection in the observation recorded about 12 days after the appearance of the disease under both the chlorine and antibiotic treatments, and in the second observation 15 days later it was associated with significantly

less infection as compared to *Taichung Native-1*. *IR-48* is slightly less susceptible to bacterial blight. Therefore, the disease could be checked more effectively in this case.

TABLE I  
The effect of treatments on the incidence of bacterial blight

Treatments	Variety	Disease incidence			
		Number of Disease pockets		Number of Infected plants	
		Sept. 9-10	Sept. 24-25	Sept. 9-10	Sept. 24-25
1	2	3	4	5	6
Chlorine at 1 ppm	<i>Taichung Native-1</i>	2	9	12	135
do.	<i>IR-48</i>	Nil	4	Nil	35
Spraying with Antibiotic + Copper	<i>Taichung Native-1</i>	3	5	18	159
	<i>IR-48</i>	Nil	1	Nil	13
Control (no treatment)	<i>Taichung Native-1</i>	13	76	157	2845
	<i>IR-48</i>	6	78	71	3319

Based upon these results it is considered that the current recommended plant protection measures for bacterial blight comprising of seed treatment followed by spraying with antibiotic and Cu<sup>4</sup> could be improved upon by including one or two applications of chlorine and cutting down the number of antibiotic sprays to the minimum. This is being worked out.

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1. Thompson, D. L., *Crop Science*, 1965, 5, 389.
2. Inoue, Y., Goto, K. and Ohata, K., *Bull. Div. Pl. Breed. Tokai-Kinki agric. Exp. Sta.*, 1957, 4, 74.
3. Tagami, Y. S., Kuhara, S., Kurita, T., Fugii, H., Sekiya, N., and Sato, T., *Bull. Kyushu Agric. Exp. Sta.*, 1964, 10, 23.
4. Jain, S. S., Reddy, P. R. and Padmanabhan, S. Y., *Indian Phytopath.*, 1966, 19, 129.