Iodine

The Experiment of Analysis of Direct Contamination Pathway of Elemental Iodine in Rice

,　　,　　,　　,　　,

150

iodine   I   (I2)

.   9

　　I   .   ,   ,

ICP-mass spectrometry   I   .   I

,   I   .

　I   .

I   .

Abstract

Experiment were carried out in order to obtain information about direct contamination of radioiodine in rice. According to the state of growth, each rice was exposed to I-gas in container for exposure during the experiments. After harvest and dry rice that was separated with chaff, hulled seed, straw, We detected them with the method of ICP-mass spectrometry. Concentration of I in hulled seed was decreased with the time of closing Max. exposure to a period of harvest, Otherwise, Concentration of I in chaff was increased. If the detection of concentration in straw that was harvested and in the crops that was just exposed is completed, We will use this data to predict concentration of I in rice for accidents during growth stage.

1.

iodine(I)   [1]

.   I

.

                    I   I-131   I-129   .[1] I-131

        8

                    grass   cow   milk   [2]   .

                    . I-129   I-131   1.57×

10^7 .

                                                                    I

        I(I_2,   I   )[3]   I

            [1]   .

2.

 1)

        .   41cm,   33cm,   25cm

                        .   6.1g   (N : P : K

= 21% : 17% : 17%), 15g   50g   2

                    8   3   .

    1999   5   21   6   1   4   10

                            .

1   .

Table 1. Physical and chemical properties of top 15cm soil
in the culture box

pH (1:2.5)	O.M. (%)	Avail. phosphate (ppm)	C.E.C (me/100g)	E.C.(me/100g)			Sand (%)	Silt (%)	Clay (%)	Soil type
				Ca	Mg	K				
5.1	1.56	111.8	3.3	1.38	0.36	0.67	73	23	4	Sandy loam

O.M. : Organic matter, C.E.C. : Cation exchange capacity.

E.C. : Exchangeable cation.

2)   I

9

I   (I₂)   .   118cm(L) ×

92cm(W) ×   150cm(H)   .

.   I   1   I₂

fan

. 1   I₂   35   60mg

80   90   100%   .

8   I

8   .   .   7 7 , 7 21 , 8

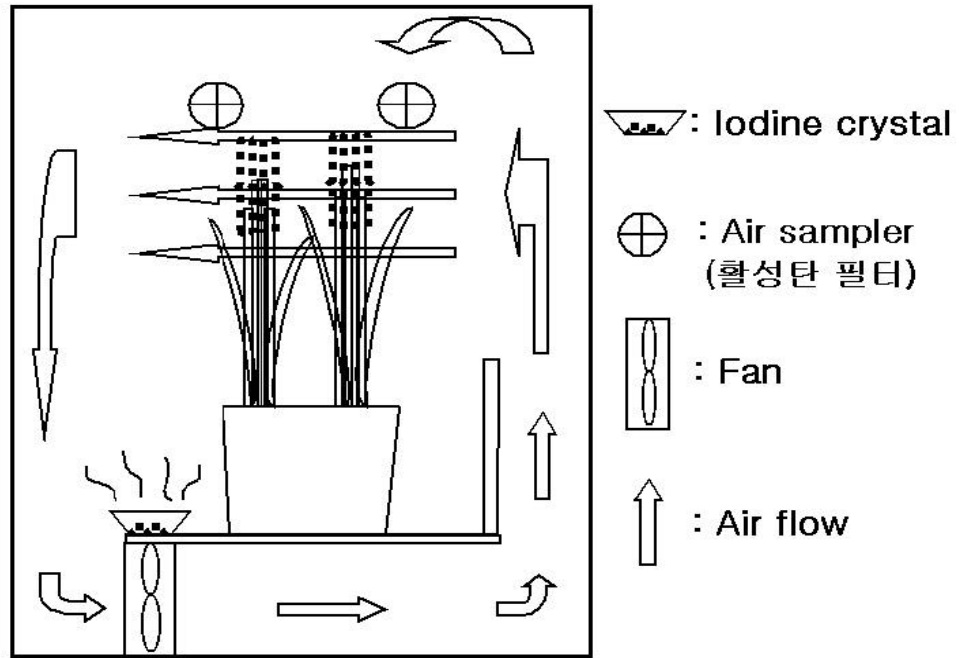11 , 8 18 , 8 23 , 9 1 , 9 4 , 9 15 , 10 5   ,   8 11

Fig. 1. Schematic diagram showing the exposure of rice plants
to I gas in an exposure box

3)

1   2   12   7cm

.

.   10   14

18   ,   ,

.

.   I   I   [4]   ICP-mass spectrometry   [5]

.   I-125   tracer

I-125   -spectrometry   .

'2000

4)

                I   .

I   I   (A,
/ g)   .

$$A \quad = \quad \frac{I \qquad (\quad /g)}{I \qquad\qquad (g/ \quad)} \qquad (1)$$

        I   I

        (R, %)   .

$$R \quad = \quad \frac{I \qquad (g)}{I \qquad (g)} \times \ 100 \qquad (2)$$

        I   (   )

(T)   .

$$T \quad = \quad \frac{I \qquad (g)}{I \qquad (g)} \qquad (3)$$

3.

1)   **I**

    2   I

        .   13.5

            80   18.2   37.8
   .

   ,   46.4% 63.1%   7   9

             .

.

77.6klux,

18.1klux   .   I   2.6× 10^{-5} g/l   6.5×

2. Meteorological condition and I_2 concentration in the exposure box
during each exposure.

Code of exposure	Date of exposure	Temperature( )		Rel. humidity(%)		Radition(Klux)		I_2 conc.* in air(g/)
		Range	Mean	Range	Mean	Range	Mean	
E1	July.7	31.9-39.6	36.0	45.9-46.5	46.4	67.6-88.0	77.6	3.8× 10^{-5}
E2	July.21	35.3-41.0	37.8	46.4-49.7	47.2	58.9-84.3	72.7	3.5× 10^{-5}
E3	Aug.11	33.6-38.2	36.5	46.1-57.2	49.8	35.6-69.3	53.4	4.8× 10^{-5}
E4	Aug.18	28.6-29.8	29.3	61.2-64.8	62.6	11.2-24.6	18.1	2.6× 10^{-5}
E5	Aug.23	25.3-34.7	30.5	50.3-58.0	52.1	56.4-80.1	69.2	4.7× 10^{-5}
E6	Sep.1	28.2-32.8	29.3	46.8-65.0	51.7	19.6-68.4	36.6	2.6× 10^{-5}
E7	Sep.4	28.3-38.8	31.8	45.6-52.6	47.5	39.2-88.0	67.5	6.5× 10^{-5}
E8	Sep.15	26.5-40.0	32.4	42.5-55.1	48.7	53.2-72.7	63.9	5.4× 10^{-5}
E9	Oct.5	17.6-20.1	18.2	62.4-66.0	63.1	9.8-35.5	16.3	5.3× 10^{-5}

* Average for the whole exposure time

10^{-5} g/l   . I_2 , I_2 ,

I_2 ,   ,

.

.

2)   **Iodine**

I   (/g)

2   .

'2000
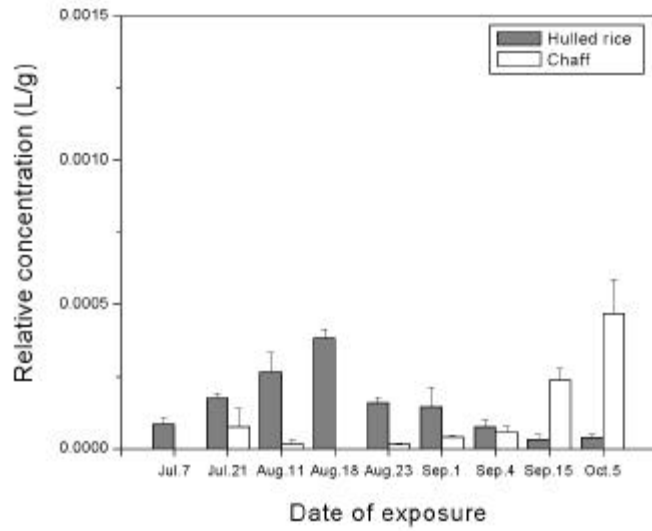

Fig. 2. I concentrations in hulled seed and chaff of the mature rice
plants exposed to elemental I at different growth stage.

        I   8 18

           .   7   7 , 7

21   8   11   I

       I   [6][7]   .

    I

     .

      .

               ,

 ,

     I   .

4.

     9   I

    .

'2000

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.

. I (I₂) 2.5

.

. I I

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. I .

———————

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