FY 2018 Survey Results of Agricultural Chemicals in Drainage Waters of Golf Courses

November 18, 2019

The Ministry of the Environment has collected the results of monitoring surveys of agricultural chemicals in drainage waters of golf courses, conducted by local government in FY 2018.

The monitoring surveys were conducted in accordance with the “Guideline for the Prevention of Water Pollution, and Damage to Aquatic Animals and Plants by Agricultural Chemicals Used in Golf Courses”, hereinafter referred to as “the Guideline”. A total of 38,188 samples from 1,481 golf courses were measured in the surveys, and five samples of the drains exceeded reference values of concentrations set in the Guideline (Table 1 and Table 2). The reference values are as of March 5, 2019.

Table 1 Summary of survey results*

Prefectures	Number of golf courses surveyed	Number of agricultural chemicals surveyed	Total number of samples*, **	The number of samples surveyed from drains	Number of samples exceeding the reference value***		O.R***
					W.P	D.A	
Hokkaido	100	67	1,050	407	0	0	0
Aomori	15	59	378	230	0	0	0
Iwate	24	80	214	46	0	0	0
Miyagi	22	55	340	22	0	0	0
Akita	17	42	105	18	0	0	0
Yamagata	4	33	123	6	0	0	3
Fukushima	30	102	1,278	551	0	0	0
Ibaraki	116	130	3,233	1,309	0	2	5
Tochigi	98	142	2,683	800	0	0	0
Gunma	64	110	1,065	50	0	0	2
Saitama	82	129	2,107	172	0	0	14
Chiba	7	36	148	62	0	0	0
Tokyo	20	82	527	368	0	0	10
Kanagawa	49	97	1,223	438	0	0	0
Yamanashi	0	0	0	0	—	—	—
Nagano	66	141	2,514	165	0	0	15
Niigata	41	81	951	374	0	0	39
Toyama	15	88	805	805	0	0	59
Ishikawa	24	61	238	69	0	0	0
Fukui	3	17	14	5	0	0	0
Gifu	42	57	316	60	0	0	0
Shizuoka	16	80	440	282	0	0	0
Aichi	25	105	379	45	0	0	2
Mie	51	80	565	98	0	0	2
Shiga	45	64	635	87	0	3	0
Kyoto	30	121	970	563	0	0	3
Osaka	39	112	818	204	0	0	2
Hyogo	129	169	7,745	380	0	0	0
Nara	24	49	878	462	0	0	0
Wakayama	3	40	180	0	—	—	—
Tottori	2	6	7	0	—	—	—
Shimane	7	31	188	0	—	—	—
Okayama	35	102	1,409	212	0	0	14
Hiroshima	8	55	408	408	0	0	0
Yamaguchi	1	10	20	0	—	—	—
Tokushima	14	22	137	48	0	0	0
Kagawa	18	33	249	7	0	0	0
Ehime	26	26	53	0	—	—	—
Kochi	8	27	108	0	—	—	—
Fukuoka	8	37	152	58	0	0	0
Saga	15	65	445	151	0	0	3
Nagasaki	19	94	687	27	0	0	0
Kumamoto	34	95	1,080	58	0	0	0
Oita	25	68	382	34	0	0	2
Miyazaki	27	60	239	30	0	0	0
Kagoshima	25	112	627	54	0	0	0
Okinawa	8	42	75	0	—	—	—
Total	1,481	174	38,188	9,165	0	5	175

Notes* The total number of samples includes those surveyed by municipalities and golf courses reported to their prefectures.

Notes** The total number of samples includes those collected from drain, pond in golf courses, and water outside of golf courses.

Notes*** “W.P”: Water Polluiton; “D.A”: Damage to Aquatic Animals and Plants, “O.R”: number of samples the detection limit exceeded the reference value.

Table 2 Summary of survey results of each chemical in golf course drains

	Agricultural chemicals	Number of samples	Concentration range detected (μg/L)	Number of Detection	Reference Value (μg/L)*		Number of samples exceeding the reference value**		O.R**
					W.P	D.A	W.P	D.A	
1	EPN	3	N.D.	0	37	0.50	0	0	0
2	MCPA-Isopropylamine MCPA-Ethyl MCPA-Sodium	39	N.D. — 5	4	51	81,000	0	0	0
3	Azimsulfuron	2	N.D.	0	2,500	730	0	0	0
4	Asulam-sodium or Asulam	491	N.D. — 86	70	10,000	90,000	0	0	0
5	Acetamiprid	58	N.D.	0	1,800	25	0	0	0
6	Acephate	66	N.D.	1	63	55,000	0	0	0
7	Azoxystrobin	436	N.D. — 20	72	4,700	280	0	0	17
8	Atrazine	10	N.D. — 3.1	4	U.D.	1,500	0	0	0
9	Amisulbrom	24	N.D.	0	2,000	36	0	0	0
10	Ametocradin	4	N.D.	0	71,000	64	0	0	0
11	Alachlor	18	N.D.	0	200	47	0	0	0
12	Isoxathion	67	N.D.	0	50	0.20	0	0	15
13	Isoxaben	35	N.D.	0	1,300	1,300	0	0	0
14	Isoprothiolane	79	N.D. — 0.3	2	2,600	9,200	0	0	0
15	Ipfencarbazone	1	N.D.	0	26	210	0	0	0
16	Iprodione	106	N.D. — 11	6	3,000	1,800	0	0	0
17	Iprobenfos or IBP	3	N.D.	0	930	2,700	0	0	0
18	Imazosulfuron	8	N.D. — 7.8	1	U.D.	6,900	0	0	0
19	Imicyafos	1	N.D.	0	10	520	0	0	0
20	Imidacloprid	101	N.D. — 0.0005	1	1,500	19	0	0	3
21	Iminoctadine tris(Albesilate) Iminoctadine-Triacetate	142	N.D. — 1	2	60	27	0	0	0
22	Imibenconazole	2	N.D.	0	260	180	0	0	0
23	Indaziflam	40	N.D.	0	500	710	0	0	0
24	Ethephon	4	N.D.	0	U.D.	71,000	0	0	0
25	Ethoxysulfuron	43	N.D.	0	1,400	3,000	0	0	0
26	Etofenprox	39	N.D.	0	820	6.7	0	0	2
27	Etobenzanide	27	N.D. — 1	2	1,100	780	0	0	0
28	Oxadiargyl	40	N.D. — 4	2	200	73	0	0	0
29	Oxaziclomefone	120	N.D. — 1.4	2	240	8,300	0	0	0
30	Oxytetracycline	7	N.D.	0	700	840	0	0	0
31	Oxine-Copper	133	N.D. — 4	28	200	18	0	0	2
32	Oryzalin	14	N.D. — 2	2	U.D.	750	0	0	0
33	Cadusafos	1	N.D. — 0.6	1	6.6	2.5	0	0	0
34	Cafenstrole	88	N.D. — 20	6	70	20	0	0	4
35	Quinoclamine or ACN	32	N.D.	0	55	63	0	0	4
36	Captan	88	N.D. — 1	1	2,000	26	0	0	9
37	Cumyluron	34	N.D. — 0.4	1	200	900	0	0	0
38	Glyphosate-Ammonium Glyphosate-Isopropylammonium Glyphosate-Potassium Gyphosate-Sodium	32	N.D. — 0.01	1	26,600	62,000	0	0	0
39	Glufosinate Glufosinate-P-Sodium	1	N.D.	0	240	100,000	0	0	0
40	Kresoxim-Methyl	9	N.D.	0	9,500	160	0	0	0
41	Clothianidin	415	N.D. — 10	51	2,500	28	0	0	10
42	Chlorantraniliprole	204	N.D. — 1.9	7	6,900	29	0	0	4
43	Chlorimuron-Ethyl	52	N.D. — 1.8	1	2,000	37	0	0	0
44	Chlorpyrifos	34	N.D.	0	20	0.46	0	0	11
45	Chlorfluazuron	48	N.D.	0	870	0.29	0	0	12
46	Chlorpropham or IPC	6	N.D.	0	1,000	3,700	0	0	0
47	Chlorothalonil or TPN	160	N.D. — 0.0005	1	400	80	0	0	0
48	Cyazofamid	86	N.D. — 8	2	4,500	88	0	0	2

Agricultural chemicals		Number of samples	Concentration range detected (μg/L)	Number of Detection	Reference Value (μg/L)*		Number of samples exceeding the reference value**		O.R**
					W.P	D.A	W.P	D.A	
49	Cyanazine	5	N.D.	0	14	290	0	0	0
50	Cyantraniliprole	3	N.D.	0	250	18	0	0	0
51	Dicamba (MDBA) Dicamba-Potassium or MDBA-Potassium Dicamba-Dimethylammonium or MDBA-Dimethylammonium	51	N.D. — 3	1	9,300	88,000	0	0	0
52	Cyclosulfamuron	147	N.D. — 5	3	800	35	0	0	4
53	Dithiopyr	84	N.D. — 10	2	95	560	0	0	0
54	Dinotefuran	3	N.D.	0	5,800	120	0	0	0
55	Cyhalothrin	8	N.D.	0	U.D.	0.081	0	0	2
56	Difenoconazole	92	N.D. — 20	5	250	750	0	0	0
57	Cyproconazole	95	N.D. — 3	10	300	20,000	0	0	0
58	Simazine or CAT	63	N.D. — 1	0	30	1,700	0	0	0
59	Simeconazole	51	N.D. — 1	3	220	14,000	0	0	0
60	Silafluofen	11	N.D.	0	2,900	0.67	0	0	0
61	Ziram	45	N.D. — 5	9	U.D.	9.6	0	0	7
62	Streptomycin Sulfate or Streptomycin	5	N.D.	0	U.D.	4,100	0	0	0
63	Spinetoram	7	N.D.	0	630	3,100	0	0	0
64	Diazinon	106	N.D. — 1.2	8	50	0.77	0	1	24
65	Daimuron	2	N.D.	0	7,900	420	0	0	0
66	Thiacloprid	29	N.D. — 2	3	U.D.	36	0	0	0
67	Thiamethoxam	125	N.D. — 27	61	470	35	0	0	0
68	Thiram or Thiuram	148	N.D. — 2	3	200	100	0	0	0
69	Thiodicarb	118	N.D. — 1	2	800	27	0	0	5
70	Thiophanate-Methyl	119	N.D. — 3	2	3,000	1,000	0	0	0
71	Thiobencarb or Benthiocarb	18	N.D.	0	200	260	0	0	0
72	Thifensulfuron-Methyl	2	N.D.	0	250	64,000	0	0	0
73	Thifluzamide	255	N.D. — 17	74	370	1,400	0	0	0
74	Tetraconazole	66	N.D. — 0.2	1	100	2,800	0	0	0
75	Tebuconazole	206	N.D. — 120	22	770	2,600	0	0	0
76	Tebufenozide	47	N.D. — 0.0005	1	420	830	0	0	0
77	Triaziflam	68	N.D. — 5	1	230	2,500	0	0	0
78	Triclopyr	93	N.D. — 1.5	1	60	U.D.	0	0	0
79	Trichlorfon or DEP	35	N.D.	0	50	1.1	0	0	8
80	Trinexapac-Ethyl	26	N.D.	0	150	57,000	0	0	0
81	Triflumizole	47	N.D.	0	390	860	0	0	0
82	Trifloxystrobin	23	N.D.	0	1,000	15	0	0	0
83	Trifloxysulfuron-Sodium	30	N.D.	0	U.D.	280	0	0	0
84	Tolclofos-Methyl	201	N.D. — 200	43	2,000	U.D.	0	0	0
85	Napropamide	56	N.D. — 1	1	300	U.D.	0	0	0
86	Nicosulfuron	4	N.D.	0	U.D.	98,000	0	0	0
87	Nitenpyram	3	N.D.	0	14,000	110	0	0	0
88	Paclobutrazol	6	N.D.	0	530	25,000	0	0	0
89	Validamycin A or Validamycin	34	N.D. — 1,200	2	12,000	100,000	0	0	0
90	Halosulfuron-Methyl	98	N.D. — 1	1	2,600	50	0	0	1
91	Picarbutrazox	3	N.D.	0	610	340	0	0	0
92	Bispyribac-Sodium	5	N.D.	0	U.D.	12,000	0	0	0
93	Bifenthrin	47	N.D.	0	260	0.058	0	0	2
94	Hymexazol or Hydroxyisoxazole	56	N.D. — 1	3	1,000	28,000	0	0	0
95	Pyraclostrobin	6	N.D.	0	900	6.0	0	0	0
96	Pyrazosulfuron-Ethyl	18	N.D. — 5	3	200	8.7	0	0	0
97	Pyraflufen-Ethyl	3	N.D.	0	4,500	8.2	0	0	10
98	Pyributicarb	48	N.D. — 0.0005	1	230	100	0	0	0

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					W.P	D.A	W.P	D.A	
99	Pyribencarb	31	N.D.	0	1,000	600	0	0	0
100	Pyroxasulfone	94	N.D. — 16	41	500	7.4	0	4	0
101	Fenitrothion or MEP	125	N.D. — 6.1	3	30	U.D.	0	0	0
102	Fenoxasulfone	42	N.D. — 4	6	4,500	9.3	0	0	0
103	Fenobucarb or BPMC	26	N.D.	0	340	19	0	0	0
104	Ferimzone	13	N.D.	0	500	6,200	0	0	0
105	Fthalide	8	N.D.	0	U.D.	870	0	0	0
106	Butamifos	54	N.D.	0	200	620	0	0	0
107	Flazasulfuron	77	N.D. — 3	4	300	170	0	0	0
108	Furametpyr	21	N.D.	0	100	1,400	0	0	0
109	Fluoxastrobin	2	N.D.	0	390	470	0	0	0
110	Fluxapyroxad	60	N.D. — 7	8	550	290	0	0	0
111	Fludioxonil	28	N.D. — 0.0005	1	8,700	770	0	0	0
112	Flucetosulfuron	14	N.D.	0	1,000	79,000	0	0	0
113	Flutolanil	88	N.D. — 0.3	4	2,300	3,100	0	0	0
114	Flubendiamide	79	N.D. — 0.6	2	450	58	0	0	0
115	Flupoxam	129	N.D. — 5	13	210	2,300	0	0	0
116	Flumioxazin	1	N.D.	0	470	U.D.	0	0	0
117	Flurprimidol	2	N.D.	0	390	11,000	0	0	0
118	Prodiamine	78	N.D. — 0.5	4	1,700	4.6	0	0	4
119	Procymidone	3	N.D.	0	930	4,200	0	0	0
120	Propamocarb Hydrochloride	30	N.D. — 0.0005	1	7,700	100,000	0	0	0
121	Propargite or BPPS	1	N.D. — 0.0005	1	260	U.D.	0	0	0
122	Propiconazole	135	N.D. — 50	11	500	5,600	0	0	0
123	Propyzamide	126	N.D. — 9	6	500	4,700	0	0	0
124	Propineb	51	N.D. — 20	1	U.D.	210	0	0	0
125	Prohexadione-Calcium	3	N.D.	0	5,300	93,000	0	0	0
126	Florasulam	26	N.D.	0	U.D.	94	0	0	0
127	Hexaconazole	70	N.D. — 1	6	120	2,900	0	0	0
128	Benomyl	20	N.D.	0	200	350	0	0	0
129	Permethrin	92	N.D. — 1	4	1,000	1.7	0	0	11
130	Pencycuron	346	N.D. — 8.4	30	1,400	1,000	0	0	0
131	Benzyladenine or Benzylaminopurine	4	N.D.	0	1,600	19,000	0	0	0
132	Bensultap	8	N.D.	0	900	U.D.	0	0	0
133	Bentazon-Sodium or Bentazon	3	N.D.	0	U.D.	88,000	0	0	0
134	Penthiopyrad	40	N.D. — 0.0005	1	2,000	560	0	0	0
135	Pendimethalin	138	N.D. — 1	3	3,100	140	0	0	0
136	Penflufen	54	N.D. — 5	9	530	100	0	0	0
137	Benfluralin or Bethrodine	50	N.D. — 0.0005	1	100	29	0	0	0
138	Benfuresate	8	N.D.	0	690	21,000	0	0	0
139	Boscalid	77	N.D. — 0.11	4	1,100	5,000	0	0	0
140	Phosethyl-Alminium or Phosethyl	67	N.D. — 0.01	1	23,000	28,000	0	0	0
141	Foramsulfuron	60	N.D.	0	13,000	97,000	0	0	0
142	Manzeb	21	N.D.	0	U.D.	120	0	0	0
143	Mandestrobin	4	N.D.	0	5,000	1,200	0	0	0
144	Myclobutanil	11	N.D.	0	630	9,700	0	0	0
145	Mecoprop-Potassium Mecoprop-Dimethylammonium Mecoprop-P-Isopropylammonium Mecoprop-P-Potassium	134	N.D. — 40	8	470	81,000	0	0	0
146	Metamifop	9	N.D.	0	110	280	0	0	0
147	Metalaxyl Metalaxyl-M	122	N.D. — 1.6	6	580	95,000	0	0	0
148	Methoxyfenozide	7	N.D.	0	2,600	3,700	0	0	0
149	Metconazole	52	N.D. — 50	3	500	2,100	0	0	0

	Agricultural chemicals	Number of samples	Concentration range detected (μg/L)	Number of Detection	Reference Value (μg/L)*		Number of samples exceeding the reference value**		O.R**
					W.P	D.A	W.P	D.A	
150	Metsulfuron-Methyl	4	N.D.	0	U.D.	8,700	0	0	0
151	Metolachlor S-Metolachlor	42	N.D. ― 43	12	2,500	230	0	0	0
152	Mepronil	79	N.D. ― 3	2	1,000	4,200	0	0	0
153	Iodosulfuron-Methyl-Sodium	9	N.D.	0	U.D.	610	0	0	0
154	Rimsulfuron	8	N.D. ― 2	1	U.D.	9,800	0	0	0
155	Lenacil	3	N.D.	0	U.D.	150	0	0	0
156	Dicopper chloride trihydroxide Copper (Ⅱ) hydroxide sulfate Copper (Ⅱ) hydroxide Copper (Ⅱ) sulfate Copper (Ⅱ) sulfate pentahydrate	2	N.D.	0	U.D.	3.8	0	0	2
	total	9,165		734			0	5	175

Notes* "U.D.": the reference value is not determined yet, colored cells: newly determined values last fiscal year.

Notes** "W.P": Water Polluiton; "D.A": Damage to Aquatic Animals and Plants, "O.R": number of samples the detection limit exceeded the reference value.