

PUBLISHED ON 29TH FEB 2012**RESPONSE OF DILL TO FLUORIDE AS A SOIL POLLUTANT****J. S. PATEL AND G. R. PATEL*****SCIENCE COLLEGE, HIMATNAGAR.****SHETH M.N. SCIENCE COLLEGE, PATAN.*****INTRODUCTION :**

Fluorosis caused by fluoride is an important public health problem in India, and it is also in Gujarat (Khoshoo 1988). Fluoride taken up by plant from soil or air is transferred to animals by ingestion of plants and their parts (Bunce 1983). Fluoride may accumulate in food and vegetation grown on fluoride rich soil; Fluoride has damaged plants either as a pollutant or by accumulation from the soil (Treshow 1970). Dill (*Anethum graveolens*) is an annual plant and seeds are used for medicinal purpose, spice and flavor also. Dill is widely cultivated in Gujarat. The status of fluoride in soil and ground water of Gujarat is reported by Mariappan et al (2000). It was thought of interest to study the response of Dill to fluoride as a soil pollutant.

KEY WORDS : *Pollutant, Fluoride, Coriander, Growth.*

MATERIALS AND METHODS :

The earthen pots lying with polythene bag were filled with 5 kg garden soil. The soil was contaminated with fluoride as a sodium fluoride (NaF). The graded concentration i.e. 0.0(con), 100, 200, 300, 400, and 500 mg NaF/kg soil was added separately to the pots. The plants were raised using normal practice. The growth parameters were studied (Hunt 1978) as follows:

[A] Study on Vegetative Growth:

1. Root and stem length (cm/plant)
2. Leaf number (no/plant)
3. Fresh and Dry weight of root, stem and leaf (g/plant).

[B] Study on Reproductive Growth:

1. Number of flowering and fruiting inflorescence (no/plant)
2. Fresh and Dry weight of fruiting inflorescence (g/plant)
3. Seed weight (g/plant).

RESULTS AND CONCLUSIONS:

Effect of fluoride on root, stem elongation (cm/plant) and leaf number (no/plant) of Dill raised from fluoride contaminated soil, (Table: 1). Fluoride as a soil pollutant lowered the vegetative growth of Dill. Decrease in seed number by fluoride may lower the economic value of Dill. Effect of fluoride on root, stem and leaf fresh and dry weight of Dill raised from fluoride contaminated seeds (Table: 2). The effect of NaF was related with concentration of NaF. Inhibitory effect was visible in 30 days old plants. Root was most affected organ. Reproductive growth of Dill raised from contaminated seeds as per Table: 3. The flowering and fruiting in Dill were delayed by more than 200 ppm NaF. The reproductive growth and yield was lowered in Dill grown on fluoride contaminated soil. Flowering did not occur in the plants grown on 500 ppm NaF soil. It is suggested that cultivation of Dill should be avoided in the area having fluoride-contaminated soil.

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Table-1: Response of elongation and leaf number of Dill to fluoride as a soil pollutant.

Growth Period (days)	Control	100 ppm NaF	200 ppm NaF	300 ppm NaF	400 ppm NaF	500 ppm NaF
Root Length (cm/plant)						
15	5	5.1	4.4	2.8	2.6	1.8
30	5.9	5.4	4.7	3.9	3.3	2.6
45	8.8	8.5	8.3	8.2	7.6	5.8
60	10.3	10.1	9.8	9.2	7.8	5.9
75	13.6	13.1	12.5	10.3	8.3	6.1
85	13.7	13.2	12.5	10.3	8.3	6.1
Stem Length (cm/plant)						
15	1.8	2	1.6	1.4	1.2	1
30	4.8	4.5	3.8	3.5	2.5	1.9
45	22.7	21.5	21.3	16.8	12.9	10.1
60	34.7	32.8	26.7	23.8	13.8	11
75	39.2	35.5	30.6	27	14.4	11.2
85	39.2	35.8	30.6	27.5	14.5	11.2
Leaf Number (no/plant)						
15	1	1	1	0	0	0
30	5	4	4	4	4	3
45	15	16	15	12	10	6
60	36	33	30	26	18	15
75	48	42	38	35	23	21
85	38	33	25	22	12	10

Table-2: Response on weight of Dill to fluoride as a soil pollutant.

Growth Period (days)	Control	100 ppm NaF	200 ppm NaF	300 ppm NaF	400 ppm NaF	500 ppm NaF	Control	100 ppm NaF	200 ppm NaF	300 ppm NaF	400 ppm NaF	500 ppm NaF		
Root fresh weight (g/plant)							Root dry weight (g/plant)							
15	0.04	0.0	0.0	0.02	0.0	0.0	0.008	0.00	0.007	0.00	0.00	0.00		
30	0.08	0.2	4	3	0.05	0.1	2	1	0.018	8	0.014	6	5	2
45	0	0.7	0.0	4	0.0	0.0	0.035	0.01	0.032	0.0	0.01	0.01	0.00	
60	0.26	8	6	0.19	4	2	0.038	7	35	2	0.02	5		
75	0.29	0.2	0.1	0.22	0.1	0.0	0.042	0.03	0.038	0.02	4	0.01		
85	0.24	0.2	9	0.19	2	8	0.044	5	0.04	8	0.03	8		
		5	0.2		0.1	0.1		0.03		0.03	1	0.01		
		0.2	4		7	1		8		4	0.03	9		
		7	0.2		0.2	0.1		0.04		0.03	2	0.02		
		0.2	6		1	2		2		6	0.03	0.02		
		1	0.2		0.1	0.0		0.04		0.03	2	1		
			1		7	9		2		6				
Stem fresh weight (g/plant)							Stem dry weight (g/plant)							
15	0.07	0.0	0.0	0.04	0.0	0.0	0.01	0.00	0.008	0.00	0.00	0.00		
30	0.15	5	5	0.12	3	2	2	9	0.028	5	4	2		
45	0.77	0.1	0.1	0.50	0.1	0.1	0.03	0.03	0.136	0.02	0.01	0.01		
60	0.03	4	3	1.63	0	0.3	6	0.14	0.36	2	8	0.04		

75	2.48	0.6	0.6	1.82	0.4	6	0.14	0.39	0.418	0.09	0.07	2
85	2.41	9	5	2	4	1.1	8	8	0.42	0.32	5	0.22
		1.9	1.8		1.4	7	0.41	0.50		2	0.26	0.25
		2	8		8	1.2	0.51	3		0.38	0.3	5
		2.3	2.0		1.5	2	5	0.51		3	0.31	0.26
		7	7		0	1.1	0.54	5		0.4		
		2.3	2.0		1.4							
		3	6		1							
	Leaf fresh weight (g/plant)						Leaf dry weight (g/plant)					
15	0.16	0.1	0.1	0	0	0	0.02	0.01	0.015	0	0	0
30	0.77	4	3	0.45	0.4	0.3	0.06	7	0.049	0.03	0.03	0.02
45	1.87	0.5	0.5	1.44	4	9	5	0.05	0.108	2	0.08	6
60	4.32	6	2	3.12	1.2	0.7	0.11	4	0.272	0.08	0.15	0.06
75	5.76	1.8	1.8	4.22	0	2	2	0.11	0.398	4	2	0.11
85	3.58	9	1	2.05	2.1	1.8	0.34	5	0.36	0.21	0.28	2
		3.9	3.6		6	5	0.46	0.29		0.37	5	0.19
		6	1		2.2	1.9	3	5		0.30	0.20	0.15
		5.1	4.5		4	3	0.46	0.41		8	2	
		4	6		1.5	0.8	8	2				
		3.3	2.2		6	0		0.42				
		1	5					2				

Table-3: Response on reproductive growth of Dill to fluoride as a soil pollutant.

Parameter	Growth Period (days)	Control	100 ppm NaF	200 ppm NaF	300 ppm NaF	400 ppm NaF	500 ppm NaF
Flowering	90	2	2	1	0	0	0
Inflorescence (no/plant)	105	4	4	2	1	1	0
	120	3	3	2	1	0	0
Fruiting Inflorescence (no/plant)	105	-	-	-	-	-	-
	120	2	2	1	0	0	0
	135	15	5	3	2	1	0
Fruit Inflo. Stock Length (cm/Inflo.)	105	-	-	-	-	-	-
	120	15	16.8	13.3	0	0	0
	135	15.1	17	13.5	8.1	7.4	0
Fruit Inflo. Fresh weight (g/plant)	105	-	-	-	-	-	-
	120	1.37	1.15	0.72	0	0	0
	135	1.805	1.45	1.02	0.45	0.24	0
Fruit Inflo. Dry weight (g/plant)	105	-	-	-	-	-	-
	120	0.655	0.55	0.355	0	0	0
	135	1.075	0.785	0.605	0.25	0.22	0
Seed Weight (g/plant)	105	-	-	-	-	-	-
	120	0.324	0.287	0.18	0	0	0
	135	0.601	0.483	0.34	0.15	0.08	0