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APPENDIX  
STATISTIC ANALYSES

**Table – I: Analysis of Variance of Temperature, pH, Electrical Conductivity and Total Solids at Seasonal Interval of Effluent and Tube-well Water (Ref. Table – 1).**

**(a) Temperature :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES	1	35.28	35.28	22.90*
AMONG TREATMENTS	2	46.70	23.35	15.16
ERROR	2	3.08	1.54	
TOTAL	5	85.06		

**(b) pH :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES	1	2.59	2.59	172.66*
AMONG TREATMENTS	2	0.06	0.03	2.0
ERROR	2	0.03	0.015	
TOTAL	5	2.68		

**(c) Electrical Conductivity :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES	1	122.04	122.04	244.08**
AMONG TREATMENTS	2	1.10	0.55	1.10
ERROR	2	1.00	0.50	
TOTAL	5	124.14		

**(d) Total Solids :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES	1	4044131.06	4044131.06	3697.42**
AMONG TREATMENTS	2	2547.64	1273.82	1.16
ERROR	2	2187.54	1093.77	
TOTAL	5	4048866.24		

\*\* Significant at P = 0.01

\* Significant at P = 0.05

DF = Degree of Freedom

SS = Sum of Squares

MSS = Mean Sum of Squares

F = Variance Ratio

The above Explanation Refers to the Present as Well as for All the Tables

**Table – II : Analysis of Variance of Dissolved Oxygen (DO), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD) and Total Alkalinity of Effluent and Tube-well Water (Ref. Table – 2).**

**(a) DO :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES	1	58.72	5872	1957.33**
AMONG TREATMENTS	2	0.06	0.03	1.00
ERROR	2	0.07	0.03	
TOTAL	5	58.85		

**(b) BOD :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES	1	105337.50	105337.50	957.61**
AMONG TREATMENTS	2	225.00	112.50	1.02
ERROR	2	220.00	110.00	
TOTAL	5	105787.50		

**(c) COD :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES	1	169344.00	169344.00	1628.36**
AMONG TREATMENTS	2	208.00	104.00	1.00
ERROR	2	208.00	104.00	
TOTAL	5	169760.00		

**(d) Total Alkalinity :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES	1	132789.13	132789.13	116481.69**
AMONG TREATMENTS	2	7.10	3.55	3.11
ERROR	2	2.29	1.14	
TOTAL	5	132798.52		

**Table – III : Analysis of Variance of Carbonate, Chloride Phosphate, Sulphate, Nitrate Nitrogen, Ammonium Nitrogen and Total Nitrogen of Effluent and Tube-well Water (Ref. Table – 3).**

**(a) Carbonate :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES	1	3842.06	3842.06	198.65**
AMONG TREATMENTS	2	41.11	20.55	1.06
ERROR	2	38.69	19.34	
TOTAL	5	3921.86		

**(b) Chloride :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES	1	72948.01	72948.01	310.19*
AMONG TREATMENTS	2	491.76	245.88	1.04
ERROR	2	470.34	235.17	
TOTAL	5	73910.11		

**(c) Phosphate :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES	1	0.2166	0.2166	618.85**
AMONG TREATMENTS	2	0.0021	0.0010	2.85
ERROR	2	0.0007	0.00035	
TOTAL	5	0.2194		

**(d) Sulphate :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES	1	72972.27	72972.27	866.03**
AMONG TREATMENTS	2	319.30	159.65	1.89
ERROR	2	168.52	84.26	
TOTAL	5	73460.09		

**(e) Nitrate Nitrogen :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES	1	0.4320	0.4320	1234.28**
AMONG TREATMENTS	2	0.0014	0.0007	2.00
ERROR	2	0.0007	0.00035	
TOTAL	5	0.4341		

**(f) Ammonium Nitrogen :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES	1	8832.78	8832.78	2989.09**
AMONG TREATMENTS	2	6.11	3.055	1.033
ERROR	2	5.91	2.955	
TOTAL	5	8844.80		

**(g) Total Nitrogen :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES	1	9179.12	9179.12	4144.07**
AMONG TREATMENTS	2	20.80	10.40	4.69
ERROR	2	4.43	2.215	
TOTAL	5	9204.35		

**Table – IV: Analysis of Variance of Seasonal Variation in Sodium, Potassium, Calcium, Magnesium, Chromium (VI) and Dye of Effluent and Tube-well Water (Ref. Table – 4).**

**(a) Sodium :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES	1	61080.82	61080.82	148.36**
AMONG TREATMENTS	2	872.37	436.18	1.05
ERROR	2	823.36	411.68	
TOTAL	5	62776.55		

**(b) Potassium :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES	1	1348.20	1348.20	179.28**
AMONG TREATMENTS	2	17.98	8.99	1.19
ERROR	2	15.04		
TOTAL	5	1381.22		

**(c) Calcium :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES	1	2969.49	2969.49	186.87**
AMONG TREATMENTS	2	36.10	18.05	18.05
ERROR	2	31.79	15.89	
TOTAL	5			

**(d) Magnesium :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES	1	2.22	2.22	1.60
AMONG TREATMENTS	2	3.41	1.70	1.23
ERROR	2	2.77	1.38	
TOTAL	5	8.40		

**(e) Chromium (VI) :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES	1	3996.42	3996.42	266.42**
AMONG TREATMENTS	2	29.80	14.90	0.99
ERROR	2	30.00	15.00	
TOTAL	5	4056.22		

**(f) Dye :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES	1	8265.88	8265.88	823.70**
AMONG TREATMENTS	2	20.06	10.03	0.99
ERROR	2	20.07	10.035	
TOTAL	5	8306.01		

**Table – V: Analysis of Variance of Physico-Chemical Properties of Soil Irrigated with Effluent and Control Soil Samples (Ref. Table – 5).**

**(a) Water Holding Capacity :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
SEASONS	2	3.77	1.88	2.84
SOIL SAMPLES	1	11.48	11.48	34.78*
ERROR	2	0.66	0.33	
TOTAL	5	15.91		

**(b) pH :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
SEASONS	2	0.13	0.065	6.50
SOIL SAMPLES	1	1.93	1.930	193.00*
ERROR	2	0.02		
TOTAL	5	2.08		

**(c) Electrical Conductivity :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
SEASONS	2	1.18	0.59	1.81
SOIL SAMPLES	1	127.05	127.05	390.92**
ERROR	2	0.65		
TOTAL	5	128.88		



**Table – VI: Analysis of Variance of Physico-Chemical Properties of Soil Irrigated with Effluent and Control Soil Samples (Ref. Table – 6).**

**(a) Organic Matter :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
SEASONS	2	0.0042	0.0021	5.8333
SOIL SAMPLES	1	0.0200	0.0200	55.5555*
ERROR	2	0.0007	0.00036	
TOTAL	5	0.0249		

**(b) Bulk Density :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
SEASONS	2	0.0031	0.00155	31.00*
SOIL SAMPLES	1	0.0170	0.0170	340.00**
ERROR	2	0.0001	0.00005	
TOTAL	5	0.0202		

**(c) Porosity :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
SEASONS	2	0.030	0.015	30.0*
SOIL SAMPLES	1	12.499	12.499	24998.60**
ERROR	2	0.001		
TOTAL	5	12.530		

**(d) Moisture :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
SEASONS	2	97.64	48.82	87.17*
SOIL SAMPLES	1	32.66	32.66	58.32*
ERROR	2	1.12	0.56	
TOTAL	5	131.42		

**Table – VII : Analysis of Variance of Physico-Chemical Properties of Soil Irrigated with Effluent and Control Soil Samples (Ref. Table – 7).**

**(a) Chromium VI :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
SEASONS	2	2.15	1.075	0.176
SOIL SAMPLES	1	328.55	328.55	54.03*
ERROR	2	12.16	6.08	
TOTAL	5	342.86		

**(b) Exchangeable Sodium :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
SEASONS	2	0.14	0.07	1.75
SOIL SAMPLES	1	50.63	50.63	1265.75**
ERROR	2	0.08	0.04	
TOTAL	5	50.85		

**(c) Exchangeable Potassium :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
SEASONS	2	0.2859	0.1429	6.35
SOIL SAMPLES	1	0.3083	0.3083	13.90
ERROR	2	0.0450	0.0225	
TOTAL	5	0.6392		

**(d) Exchangeable Calcium :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
SEASONS	2	0.2186	0.1093	1.3888
SOIL SAMPLES	1	3.4787	3.4787	44.2020*
ERROR	2	0.1574		
TOTAL	5	3.9547		

**(e) Exchangeable Magnesium :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
SEASONS	2	1.0221	0.5510	0.6543
SOIL SAMPLES	1	0.0641	0.0641	0.0761
ERROR	2	1.6842	0.8421	
TOTAL	5	2.7704		

**Table – VIII : Analysis of Variance of Physico-Chemical Properties of Soil Irrigated with Effluent and Control Soil Samples (Ref. Table – 8).**

**(a) Chloride Content :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
SEASONS	2	17.06	8.53	17.06
SOIL SAMPLES	1	299.06	299.06	598.12**
ERROR	2	1.00	0.50	
TOTAL	5	317.12		

**(b) Sulphate Content :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
SEASONS	2	62.82	31.41	2.49
SOIL SAMPLES	1	47250.50	47250.50	3758.98**
ERROR	2	25.22	12.61	
TOTAL	5	47338.54		

**(c) Carbonate Content :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
SEASONS	2	44.02	22.015	209.66**
SOIL SAMPLES	1	280.99	280.99	2676.09**
ERROR	2	0.21	0.105	
TOTAL	5	325.23		

**(d) Phosphorus Content :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
SEASONS	2	26.22	13.11	44.44*
SOIL SAMPLES	1	175.39	175.39	494.54**
ERROR	2	0.59	0.295	
TOTAL	5	202.20		

**(e) Nitrate Nitrogen :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
SEASONS	2	22.65	11.325	453.00**
SOIL SAMPLES	1	92.20	95.200	3808.00**
ERROR	2	0.05	0.025	
TOTAL	5	117.90		

**(f) Ammonium Nitrogen :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
SEASONS	2	23.95	11.975	17.87
SOIL SAMPLES	1	5330.63	5330.630	7956.16**
ERROR	2	1.34	0.670	
TOTAL	5	5355.92		

**(g) Total Nitrogen :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
SEASONS	2	50.27	25.135	15.75
SOIL SAMPLES	1	57.29	57.290	35.91*
ERROR	2	3.19	1.595	
TOTAL	5	110.75		

**Table – IX : Analysis of Variance of Per Cent Occurrence of Mycoflora Isolated from Soil Irrigated with Effluent (Ref. Table – 9).**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES	11	1.01	0.0918	0.0043
AMONG TREATMENTS	22	7308.04	332.0927	15.5819**
ERROR	242	5157.68	21.3127	
TOTAL	275	12463.13		

**Table – X: Analysis of Variance of Per Cent Occurrence of Mycoflora Isolated from Control Soil (Ref. Table – 10).**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES	11	8.6889	0.7899	0.0234
AMONG TREATMENTS	23	5147.8392	223.8190	6.6453**
ERROR	253	8521.131	33.6803	
TOTAL	287	13677.6591		

**Table – XI: Analysis of Variance of Microorganisms ( $\text{g}^{-1}$  dry soil) Isolated from Soil Samples of Control Soil and Soil Irrigated with Effluent (Ref. Table – 11).**

**(a) Fungi :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES	1	23.92	23.92	2.31
AMONG MONTHS	11	1349.3611	122.6191	11.8827**
ERROR	11	113.5571	10.3233	
TOTAL	23			

**(b) Bacteria :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES	1	36.9768	36.9768	9.9223**
AMONG MONTHS	11	176.1717	16.0156	4.2976*
ERROR	11	40.9933	3.7266	
TOTAL	23	254.1418		

**(c) Actinomycetes :**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES	1	11.78	11.78	8.18*
AMONG MONTHS	11	77.15	7.01	4.86**
ERROR	11	15.85	1.44	
TOTAL	23	104.78		

**Table – XII : Analysis of Variance of Per Cent Occurrence of Mycoflora Isolated from Soil Irrigated with Effluent Control Soil (Ref. Table – 12).**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
A (CROPPING SEASONS)	2	2423.24	1211.62	1274.36**
B (SOIL SAMPLES)	1	2680.10	2680.10	2707.07**
C (MONTHS)	4	8022.60	2005.65	2025.90**
AB	2	255.75	127.87	129.16**
AC	8	410.25	51.28	51.79**
BC	4	445.05	111.26	112.38**
ABC	8	72.45	9.05	9.14**
ERROR	60	59.97	0.99	
TOTAL	89	14369.61		

**Table – XIII : Analysis of Variance of Population Dynamics of the General Mycoflora Including Pathogen (*Fusarium oxysporum* f. sp. *lycopersici*) in the Selected Field in Term of Per Cent Frequency and Per Cent Occurrence in Non-Rhizosphere, Rhizosphers and Rhizoplane of Healthy and Wilted Plants of Tomato (Ref. Table – 13).**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
A (SOIL SAMPLES)	1	307.25	307.25	304.20**
B (MONTHS)	4	3340.71	835.17	826.90**
C (POPULATION)	4	83552.52	20888.13	20681.31*
AB	4	348.25	87.06	86.20**
AC	4	1852.92	463.23	458.64**
BC	16	2890.35	180.64	178.85**
ABC	16	369.45	23.09	22.86**
ERROR	100	101.00	1.01	
TOTAL	149	92762.45		

**Table – XIV:** Analysis of Variance of Colony Interaction Between *Fusarium oxysporum* f. sp. *lycopersici* and Some Dominant Microflora Isolated from Soil Irrigated with Effluent and Control Soil (Ref. Table – 14).

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES	2	2390.57	1195.28	5.90**
AMONG TREATMENTS	13	1263.20	97.16	0.48
ERROR	26	5259.15	202.27	
TOTAL	41	8912.92		

**Table – XV:** Analysis of Variance of Per Cent Inhibition in Radial Growth of *Fusarium oxysporum* f. sp. *lycopersici* by Volatile Substances of the Test Microorganisms at Different Interval (Ref. Table – 15).

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
INCUBATION PERIOD	4	305.69	76.42	59.24**
SPECIES	13	1061.01	81.61	63.26**
ERROR	52	67.18	1.29	
TOTAL	69	1433.88		

**Table – XVI:** Analysis of Variance of Culture Filtrates (Non-Volatiles Metabolites) of the Test Microorganisms on Per Cent Inhibition in Hyphal Dry Weight of *Fusarium oxysporum* f. sp. *lycopersici* (Ref. Table – 16).

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES	2	19.13	9.56	1.07
AMONG TREATMENTS	13	14892.82	1145.60	1673.35**
ERROR	26	231.40	0.90	
TOTAL	41	15143.35		

**Table – XVII : Analysis of Variance of Culture Filtrates (Non-Volatile Metabolites) of the Test Microorganisms on Per Cent Inhibition in Radial Growth of *Fusarium oxysporum* f. sp. *lycopersici* (Ref. Table – 17).**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES	3	4009.16	1336.38	11.55**
AMONG TREATMENTS	13	21796.10	1676.62	14.49**
ERROR	39	4510.21	115.64	
TOTAL	55	30315.47		

**Table – XVIII : Analysis of Variance of Fungicides on Per Cent Inhibition in Radial Growth of *Fusarium oxysporum* f. sp. *lycopersici* (Ref. Table – 18).**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
FUNGICIDES	8	9889.54	1236.19	28.20**
CONCENTRATION	5	9969.04	1933.80	44.24**
ERROR	40	1748.61	43.71	
TOTAL	53	21607.19		

**Table – XIX : Analysis of Variance of Insecticides on Per Cent Inhibition in Radial Growth of *Fusarium oxysporum* f. Sp. *lycopersici* (Ref. Table – 19).**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
INSECTICIDES	3	4196.16	1398.72	17.29**
CONCENTRATION	4	4769.02	1192.25	14.73**
ERROR	12	970.76	80.89	
TOTAL	19	9935.94		



**Table – XX : Analysis of Variance of Effluent on Per Cent Growth Inhibition of Some Dominant Microflora and the Test Pathogen (Ref. Table – 20).**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES (SPECIES)	14	3222.53	230.18	29.51**
AMONG TREATMENTS (CONCENTRATIONS)	3	1061.50	353.83	45.36**
ERROR	42	327.92	7.80	
TOTAL	59	4611.95		

**Table – XXI : Analysis of Variance of Cadmium on Per Cent Growth Inhibition of Some Dominant Microflora and the Test Pathogen (Ref. Table – 21).**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES (SPECIES)	14	10035.29	716.80	18.73**
AMONG TREATMENTS (CONCENTRATIONS)	3	16952.09	5650.69	147.69**
ERROR	42	1607.03	38.26	
TOTAL	59	28594.41		

**Table – XXII : Analysis of Variance of Chromium on Per Cent Growth Inhibition of Some Dominant Microflora and the Test Pathogen (Ref. Table – 22).**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES (SPECIES)	14	2659.56	211.39	22.80**
AMONG TREATMENTS (CONCENTRATIONS)	3	8528.38	2842.79	306.66**
ERROR	42	389.46	9.27	
TOTAL	59	11577.40		

**Table – XXIII : Analysis of Variance of Lead on Per Cent Growth Inhibition of Some Dominant Microflora and the Test Pathogen (Ref. Table – 23).**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES (SPECIES)	14	5028.70	359.19	11.58**
AMONG TREATMENTS (CONCENTRATIONS)	3	8230.47	2743.49	88.49**
ERROR	42	1302.29	31.00	
TOTAL	59	14561.46		

**Table – XXIV: Analysis of Variance of Nickel on Per Cent Growth Inhibition of Some Dominant Microflora and the Test Pathogen (Ref. Table – 24).**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES (SPECIES)	14	2987.23	213.37	5.09**
AMONG TREATMENTS (CONCENTRATIONS)	3	9243.44	3081.14	73.64**
ERROR	42	1757.50	41.84	
TOTAL	59	13988.17		

**Table – XXV: Analysis of Variance of Zinc on Per Cent Growth Inhibition of Some Dominant Microflora and the Test Pathogen (Ref. Table – 25).**

SOURCE OF VARIANCE	DF	SS	MSS	F TEST
AMONG SAMPLES (SPECIES)	14	2719.45	194.24	6.67**
AMONG TREATMENTS (CONCENTRATIONS)	3	9309.90	3103.30	106.71**
ERROR	42	1230.08	29.08	
TOTAL	59	13259.43		