

# The impact of U.S. biofuels policy on agricultural production and nitrogen loads in Alabama

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## Supplementary Content

### Estimation Results of the Random Coefficient Models

$$y_{jt} = \beta_{0i} + \beta_{1j}rain_{jt} + \beta_{2j}tmp_{jt} + \beta_{3j}etm_{jt} + \beta_{4j}nrate_{jt} + \beta_{5j}elnino_{jt} + \beta_{6j}lanina_{jt} + \varepsilon_{jt} ; j=1,2,\dots,120 ; t=1,2,\dots,61 \quad (4)$$

$$N_{jt} = \beta_{0j} + \beta_{1j}rain_{jt} + \beta_{2j}tmp_{jt} + \beta_{3j}nrate_{jt} + \beta_{4j}elnino_{jt} + \beta_{5j}lanina_{jt} + \varepsilon_{jt} ; j=1,2,\dots,120 ; t=1,2,\dots,61 \quad (5)$$

## CROP YIELD

**Table A1. Parameter estimates – Dependent Variable: Corn Yield.**

subwatershed	constant	rain	tmp	etm	elnino	lanina
1	9.610	0.001	0.550	0.006	0.700	0.752
2	7.959	0.001	0.450	0.006	0.715	0.777
3	9.066	0.001	0.502	0.006	0.635	0.682
4	9.697	0.001	0.549	0.006	0.698	0.750
5	9.435	0.001	0.541	0.006	0.688	0.739
6	10.164	0.001	0.536	0.006	0.670	0.720
7	8.850	0.001	0.565	0.004	0.734	0.821
8	8.767	0.001	0.563	0.004	0.734	0.822
9	7.286	0.001	0.459	0.005	0.703	0.729
10	7.632	0.001	0.493	0.004	0.643	0.719
11	6.116	0.000	0.421	0.005	0.565	0.600
12	6.134	0.000	0.422	0.005	0.567	0.601
13	8.091	0.001	0.513	0.004	0.667	0.744
14	8.773	0.001	0.563	0.004	0.733	0.821
15	8.780	0.001	0.562	0.004	0.732	0.819
16	5.646	0.000	0.385	0.004	0.525	0.560
17	6.427	0.000	0.438	0.004	0.595	0.632
18	11.325	0.001	0.628	0.006	0.819	0.935
19	10.750	0.001	0.616	0.007	0.820	0.936
20	7.720	0.001	0.432	0.004	0.570	0.620
21	10.775	0.001	0.608	0.009	0.820	0.857
22	10.635	0.001	0.626	0.009	0.853	0.878
23	0.022	0.000	0.015	0.001	0.032	0.032
24	4.154	0.005	0.262	0.005	0.368	0.410
25	4.012	0.005	0.253	0.005	0.352	0.391
26	5.913	0.000	0.403	0.004	0.550	0.589
27	6.759	0.000	0.447	0.004	0.628	0.666
28	7.804	0.001	0.397	0.006	0.732	0.787
29	11.058	0.001	0.619	0.006	0.812	0.936
30	3.766	0.005	0.238	0.005	0.337	0.369
31	10.339	0.001	0.598	0.006	0.789	0.904
32	3.760	0.004	0.239	0.004	0.338	0.371
33	10.992	0.001	0.527	0.006	0.827	0.839
34	3.767	0.005	0.238	0.005	0.337	0.370

35	8.860	0.001	0.422	0.006	0.791	0.831
36	9.071	0.002	0.426	0.006	0.791	0.836
37	9.753	0.002	0.507	0.006	0.836	0.868
38	8.072	0.001	0.422	0.005	0.697	0.721
39	8.720	0.001	0.456	0.005	0.752	0.783
40	7.951	0.001	0.488	0.004	0.653	0.709
41	6.124	0.001	0.319	0.004	0.525	0.542
42	6.184	0.001	0.323	0.004	0.532	0.549
43	7.940	0.001	0.415	0.005	0.685	0.708
44	10.965	0.001	0.512	0.006	0.808	0.819
45	7.854	0.001	0.410	0.005	0.678	0.702
46	9.691	0.001	0.539	0.005	0.715	0.782
47	8.511	0.001	0.427	0.006	0.812	0.856
48	7.388	0.001	0.392	0.005	0.647	0.672
49	8.833	0.001	0.483	0.005	0.673	0.721
50	9.929	0.001	0.554	0.006	0.758	0.820
51	10.033	0.001	0.562	0.006	0.769	0.831
52	9.870	0.001	0.548	0.006	0.743	0.801
53	10.395	0.001	0.507	0.006	0.807	0.820
54	7.930	0.001	0.441	0.005	0.613	0.654
55	8.561	0.001	0.486	0.005	0.668	0.734
56	9.497	0.001	0.491	0.005	0.653	0.722
57	7.952	0.001	0.369	0.005	0.689	0.722
58	9.464	0.001	0.485	0.005	0.645	0.711
59	4.414	0.005	0.279	0.005	0.391	0.437
60	10.055	0.001	0.526	0.005	0.706	0.759
61	4.296	0.005	0.271	0.005	0.377	0.420
62	9.881	0.001	0.551	0.005	0.687	0.739
63	8.043	0.001	0.377	0.006	0.710	0.750
64	7.591	0.001	0.383	0.005	0.728	0.762
65	9.376	0.001	0.477	0.007	0.789	0.879
66	9.081	0.002	0.431	0.006	0.807	0.850
67	11.046	0.001	0.562	0.007	0.727	0.769
68	6.408	0.001	0.344	0.004	0.714	0.745
69	8.310	0.001	0.451	0.005	0.745	0.774
70	11.031	0.001	0.570	0.005	0.690	0.734
71	8.852	0.001	0.493	0.006	0.717	0.773
72	7.762	0.001	0.431	0.005	0.631	0.680
73	9.469	0.000	0.763	0.006	0.983	1.033
74	9.373	0.000	0.745	0.006	0.962	1.016
75	7.341	0.001	0.432	0.005	0.785	0.874

76	6.382	0.001	0.380	0.005	0.693	0.758
77	9.653	0.002	0.509	0.005	0.750	0.794
78	9.674	0.002	0.510	0.005	0.751	0.796
79	10.128	0.001	0.558	0.006	0.697	0.751
80	7.723	0.001	0.381	0.006	0.643	0.712
81	7.056	0.001	0.357	0.005	0.600	0.663
82	7.270	0.001	0.369	0.005	0.614	0.678
83	9.483	0.002	0.500	0.005	0.735	0.775
84	9.949	0.001	0.532	0.006	0.665	0.717
85	8.563	0.001	0.458	0.005	0.756	0.788
86	9.703	0.002	0.514	0.006	0.759	0.805
87	8.741	0.001	0.473	0.004	0.696	0.731
88	6.263	0.001	0.346	0.005	0.721	0.754
89	12.661	0.002	0.679	0.006	0.753	0.840
90	10.584	0.001	0.571	0.005	0.708	0.767
91	8.996	0.001	0.418	0.006	0.711	0.737
92	8.983	0.001	0.410	0.006	0.701	0.724
93	9.292	0.001	0.458	0.007	0.765	0.850
94	8.836	0.001	0.411	0.006	0.702	0.729
95	8.236	0.000	0.662	0.006	0.845	0.917
96	12.518	0.001	0.623	0.008	0.793	0.853
97	6.925	0.001	0.348	0.005	0.712	0.740
98	12.734	0.002	0.637	0.008	0.805	0.864
99	8.914	0.002	0.510	0.005	0.820	0.850
100	10.685	0.002	0.492	0.007	0.808	0.882
101	11.911	0.001	0.524	0.008	0.715	0.747
102	9.827	0.001	0.454	0.006	0.664	0.704
103	8.968	0.002	0.472	0.006	0.686	0.722
104	13.253	0.002	0.611	0.007	0.842	0.894
105	8.839	0.002	0.468	0.006	0.682	0.717
106	9.818	0.001	0.454	0.006	0.668	0.708
107	6.040	0.001	0.319	0.006	0.595	0.626
108	7.109	0.001	0.382	0.005	0.465	0.494
109	6.533	0.001	0.355	0.004	0.672	0.713
110	6.540	0.001	0.355	0.004	0.671	0.713
111	11.556	0.001	0.518	0.007	0.690	0.726
112	8.363	0.001	0.499	0.004	0.662	0.695
113	7.733	0.001	0.500	0.004	0.636	0.679
114	7.784	0.001	0.373	0.007	0.609	0.620
115	7.129	0.001	0.394	0.005	0.519	0.541
116	6.124	0.002	0.349	0.005	0.712	0.738

117	7.177	0.001	0.350	0.006	0.579	0.590
118	7.219	0.001	0.380	0.005	0.560	0.572
119	6.047	0.001	0.325	0.004	0.489	0.499
120	7.196	0.001	0.387	0.005	0.575	0.589

**Table A2. T-Stat estimates – Dependent Variable: Corn Yield.**

subwatershed	constant	rain	tmp	etm	elnino	lanina
1	0.869	0.567	-3.695	5.298	1.177	3.097
2	4.548	0.583	-1.708	-3.611	-0.161	1.061
3	0.146	0.274	-3.363	6.484	1.167	3.300
4	0.390	0.445	-3.407	5.594	0.980	3.031
5	0.889	0.732	-3.610	5.200	0.898	3.066
6	-1.607	-0.034	-1.618	6.856	0.562	1.969
7	4.030	0.284	-1.773	-3.767	0.205	1.056
8	4.345	0.175	-2.072	-3.670	0.358	1.329
9	4.885	0.575	-2.155	-3.480	0.623	0.904
10	4.426	1.379	-2.725	-2.764	0.545	2.392
11	1.699	2.900	3.734	-6.142	-0.236	-0.746
12	1.698	2.908	3.724	-6.121	-0.230	-0.746
13	4.736	1.345	-2.694	-3.813	-0.182	1.379
14	4.340	0.178	-2.064	-3.685	0.350	1.315
15	4.163	0.227	-1.866	-3.768	0.263	1.143
16	2.625	3.188	2.385	-6.379	-0.010	0.098
17	1.532	2.757	3.685	-6.213	-0.303	-0.766
18	1.998	-0.854	-0.672	-1.399	0.485	0.287
19	1.972	-1.632	-0.429	-1.409	1.063	0.244
20	-1.755	-1.121	-0.027	6.332	0.862	1.810
21	0.855	0.829	-1.445	0.850	-0.069	1.623
22	1.343	0.722	-2.173	1.093	0.637	1.892
23	0.055	-1.301	2.770	0.801	-0.212	0.144
24	-0.976	-0.153	0.043	2.922	-0.786	-0.282
25	-0.553	0.863	-0.313	1.556	-0.692	-0.246
26	2.816	2.673	1.730	-5.576	0.115	0.245
27	3.032	3.244	2.113	-7.232	0.089	0.230
28	-1.580	-1.338	-1.095	4.926	0.599	1.014
29	2.237	-1.279	-1.018	-1.183	0.842	0.741
30	-1.782	-0.040	0.613	3.208	-0.736	-0.598
31	2.366	-1.002	-0.831	-1.683	0.163	0.318
32	-1.787	0.126	0.626	3.394	-0.766	-0.628
33	0.756	-0.243	-0.338	0.138	-0.242	1.124

34	-1.784	-0.046	0.614	3.213	-0.735	-0.602
35	2.180	-0.608	-1.593	-0.367	0.058	1.162
36	1.816	-1.087	-1.965	0.819	0.569	1.746
37	2.476	-0.766	-0.866	-1.770	0.352	0.348
38	2.812	-0.167	-1.778	-0.973	0.881	1.625
39	2.788	-0.374	-0.727	-2.629	0.157	0.934
40	2.154	2.870	-1.926	-0.627	-0.251	0.631
41	3.260	1.002	-3.831	1.509	0.597	1.266
42	3.339	0.772	-3.796	1.356	0.650	1.374
43	2.781	-0.262	-1.751	-0.890	0.882	1.611
44	0.927	-0.778	-0.685	0.590	0.370	1.581
45	2.839	-0.262	-2.009	-0.561	0.688	1.827
46	-1.129	-0.671	-0.221	4.385	1.086	1.772
47	3.079	0.564	-3.034	-0.221	0.581	2.123
48	3.420	0.397	-2.938	-0.433	1.133	2.146
49	0.430	-0.293	-1.045	2.514	1.092	2.530
50	1.505	0.314	-1.715	1.108	0.193	2.027
51	1.658	0.183	-1.828	1.034	0.312	2.028
52	1.362	0.933	-1.256	0.275	0.157	1.358
53	2.068	-0.083	-2.003	0.159	0.329	2.301
54	1.229	-0.128	-1.757	2.423	1.191	2.525
55	1.447	2.796	-0.306	-1.988	-2.053	-0.834
56	2.963	0.661	-0.330	-4.768	-1.922	-0.982
57	1.526	-1.380	-1.404	0.994	0.533	1.949
58	2.915	1.002	-0.362	-4.616	-1.852	-0.858
59	-0.718	0.771	-0.259	2.334	-0.539	-0.410
60	0.076	-0.541	-0.468	1.804	0.159	1.303
61	-0.455	1.177	-0.462	1.404	-0.428	-0.343
62	3.219	1.798	-1.818	-2.871	0.213	1.322
63	2.085	-0.433	-2.348	0.841	0.454	2.622
64	3.469	0.505	-2.991	-0.883	0.205	1.999
65	1.216	0.475	-1.576	1.149	-0.580	1.088
66	2.493	-0.536	-1.969	-0.446	0.276	1.444
67	-0.204	1.456	0.682	-0.074	-1.057	-0.096
68	4.416	0.489	-3.359	-1.662	0.558	1.092
69	3.598	0.973	-2.513	-1.899	0.556	1.688
70	1.009	0.866	0.067	-1.834	-1.290	-0.687
71	1.012	0.263	-2.296	2.763	0.138	1.463
72	1.078	-0.140	-2.641	3.581	1.294	2.382
73	1.360	-0.872	-0.819	0.585	0.534	0.554
74	0.738	-0.867	-0.658	1.205	0.053	0.374

75	3.324	-0.079	-0.641	-2.783	-0.693	0.114
76	4.364	0.881	-1.916	-3.039	-0.205	1.094
77	2.954	1.649	-2.423	-1.474	0.680	1.987
78	2.964	1.673	-2.441	-1.472	0.685	2.006
79	3.228	1.805	-1.963	-2.619	0.298	1.505
80	1.353	-0.269	-2.604	2.402	1.133	2.824
81	2.304	0.115	-3.427	2.113	1.082	2.849
82	1.331	-0.957	-1.745	2.146	0.993	2.407
83	2.969	1.483	-2.305	-1.646	0.619	1.710
84	3.919	2.029	-2.118	-3.383	-0.294	0.720
85	3.412	0.801	-2.463	-1.579	0.503	1.649
86	3.143	1.696	-2.723	-1.296	0.780	2.107
87	3.688	2.550	-2.452	-3.339	0.631	1.742
88	5.364	0.949	-4.621	-1.466	0.609	1.610
89	1.100	0.360	-1.188	0.543	1.142	1.608
90	3.762	1.264	-2.027	-3.728	-0.637	-0.005
91	2.615	-0.080	-4.115	1.791	0.681	2.770
92	2.944	-0.075	-4.201	1.225	0.454	2.499
93	0.939	0.402	-2.099	1.940	0.186	2.012
94	2.796	0.154	-3.907	1.102	0.485	2.385
95	0.824	-1.955	-0.845	1.429	-0.090	1.357
96	1.517	-1.136	-1.380	0.243	-0.153	1.211
97	4.677	1.237	-3.428	-2.691	-0.782	0.354
98	1.594	-1.002	-1.388	0.082	-0.167	1.192
99	1.925	0.732	-1.269	-1.008	-0.382	0.017
100	-0.623	-0.685	0.501	1.455	-0.362	0.400
101	0.467	0.268	-1.884	2.317	0.745	1.668
102	1.693	-0.567	-3.270	2.522	0.959	2.368
103	2.338	0.080	-0.927	-1.967	-0.831	-0.117
104	0.581	-1.478	-0.448	0.806	-0.110	0.373
105	2.424	0.186	-0.786	-2.278	-0.865	-0.122
106	1.836	-0.516	-3.379	2.401	0.899	2.264
107	2.377	-0.420	-2.442	0.178	0.805	0.510
108	0.683	-0.625	-0.839	0.718	1.435	2.136
109	4.635	-0.351	-5.702	2.052	1.325	2.744
110	4.548	-0.372	-5.595	2.031	1.310	2.729
111	-0.044	0.574	-1.413	2.754	0.684	1.561
112	2.748	0.694	-2.280	-0.903	-0.428	0.806
113	5.282	1.214	-3.672	-2.416	0.079	1.523
114	0.344	0.305	0.293	-0.582	-0.722	-0.115
115	0.382	0.017	-0.439	0.380	0.703	1.032

116	4.642	0.464	-4.124	-0.256	0.134	1.637
117	0.958	2.213	-0.194	-1.828	-1.254	-0.624
118	-1.040	-0.230	-0.184	3.171	-0.395	-1.026
119	1.262	-0.803	-2.105	1.947	0.939	1.380
120	-0.408	1.117	-0.396	1.606	0.335	-0.856

**Table A3. Parameter estimates – Dependent Variable: Cotton Yield.**

subwatershed	constant	rain	tmp	etm	elnino	lanina
1	3.997	0.000	-0.120	-0.001	-0.046	0.104
2	4.393	0.000	-0.004	-0.004	-0.008	-0.119
3	3.948	0.000	-0.018	-0.003	-0.040	-0.100
4	4.100	-0.001	-0.104	-0.001	0.016	0.074
5	4.189	-0.001	-0.072	-0.002	0.002	0.075
6	0.539	0.000	0.070	-0.001	0.092	-0.125
7	1.333	0.000	-0.013	-0.001	0.071	-0.070
8	1.109	0.000	0.062	-0.002	0.074	-0.026
9	4.088	0.000	-0.007	-0.004	-0.114	-0.135
10	2.324	0.000	0.004	-0.002	-0.026	-0.127
11	0.366	0.000	0.217	-0.003	0.092	0.049
12	0.354	0.000	0.215	-0.003	0.080	0.039
13	2.435	0.000	-0.059	-0.001	0.039	-0.014
14	1.293	0.000	-0.001	-0.001	0.051	-0.100
15	1.346	0.000	-0.014	-0.001	0.078	-0.066
16	1.675	0.000	0.233	-0.004	-0.098	-0.139
17	-0.287	0.000	0.305	-0.003	-0.050	-0.194
18	5.330	0.000	-0.102	-0.003	-0.002	-0.135
19	5.640	0.000	-0.125	-0.003	-0.002	-0.121
20	-0.013	0.000	0.034	0.000	0.178	-0.114
21	2.535	0.000	-0.050	-0.001	-0.025	-0.117
22	1.725	0.000	-0.086	0.000	0.065	0.113
23	1.326	0.001	-0.014	-0.001	0.056	-0.011
24	-0.089	-0.001	0.020	0.001	-0.100	-0.164
25	-0.197	-0.001	0.027	0.002	-0.124	-0.205
26	1.927	0.000	0.224	-0.004	-0.119	-0.145
27	-0.427	0.000	0.356	-0.004	-0.083	-0.263
28	2.531	0.000	-0.081	-0.001	0.142	0.018
29	5.157	0.000	-0.120	-0.003	0.035	-0.088
30	-0.125	-0.001	0.022	0.002	-0.129	-0.190
31	5.114	0.000	-0.112	-0.003	0.023	-0.106
32	-0.198	-0.002	0.022	0.003	-0.114	-0.160



33	3.259	0.000	-0.092	-0.001	0.373	0.084
34	-0.100	-0.002	0.020	0.002	-0.127	-0.185
35	3.773	0.000	-0.086	-0.002	0.026	-0.062
36	2.822	0.000	-0.048	-0.002	-0.060	-0.235
37	3.777	0.000	-0.009	-0.003	0.148	-0.035
38	4.741	0.000	-0.074	-0.003	0.175	-0.032
39	3.741	0.000	-0.014	-0.003	0.148	-0.049
40	1.817	0.000	-0.086	0.000	0.058	0.033
41	3.887	0.000	-0.121	-0.002	0.187	0.024
42	0.823	0.000	0.001	0.000	0.006	0.019
43	4.218	0.000	-0.094	-0.002	0.188	-0.029
44	3.283	0.000	-0.094	-0.001	0.360	0.082
45	3.966	0.000	-0.106	-0.002	0.205	0.018
46	-0.526	0.000	0.122	0.000	0.229	-0.194
47	3.402	0.000	-0.087	-0.002	0.056	-0.059
48	3.986	0.000	-0.112	-0.002	0.192	0.015
49	1.694	0.000	0.027	-0.002	-0.057	-0.180
50	1.277	0.000	0.026	-0.001	-0.010	-0.151
51	1.189	0.000	0.024	-0.001	-0.010	-0.136
52	0.514	0.000	0.037	-0.001	-0.025	-0.157
53	3.492	0.000	-0.111	-0.001	0.378	0.086
54	2.132	0.000	-0.045	-0.001	0.007	-0.125
55	4.304	0.001	-0.114	-0.003	-0.095	-0.073
56	5.950	0.000	-0.115	-0.004	-0.144	-0.251
57	3.210	0.001	-0.109	-0.001	0.078	-0.069
58	4.917	0.000	-0.047	-0.004	-0.198	-0.238
59	0.110	-0.001	0.013	0.002	-0.137	-0.198
60	0.737	0.000	0.018	0.000	0.006	-0.123
61	-0.143	-0.001	0.024	0.002	-0.117	-0.183
62	0.641	0.001	0.064	-0.002	-0.025	-0.049
63	4.604	0.000	-0.146	-0.002	-0.007	-0.108
64	3.352	0.000	-0.074	-0.002	-0.095	-0.184
65	2.943	0.000	-0.076	-0.001	0.154	0.146
66	3.042	0.000	-0.102	-0.001	-0.068	-0.137
67	3.183	0.001	-0.121	-0.002	-0.013	-0.007
68	2.744	0.000	-0.083	-0.001	0.115	0.061
69	2.942	0.000	-0.035	-0.002	0.165	-0.011
70	1.502	0.000	0.014	-0.001	-0.041	-0.172
71	2.753	0.001	-0.103	-0.001	0.141	0.172
72	4.221	0.001	-0.171	-0.002	0.113	0.143
73	0.042	0.000	0.121	-0.001	-0.003	-0.206

74	1.247	0.000	0.070	-0.001	0.059	-0.119
75	4.346	0.000	-0.039	-0.003	-0.138	-0.223
76	4.388	0.000	-0.101	-0.002	-0.101	-0.182
77	3.056	0.000	-0.101	-0.001	0.186	0.045
78	3.239	0.000	-0.109	-0.001	0.180	0.030
79	0.342	0.001	0.080	-0.002	-0.003	-0.087
80	3.192	0.000	-0.098	-0.001	0.111	0.100
81	0.608	0.000	0.002	0.000	-0.009	-0.004
82	3.308	0.000	-0.104	-0.001	0.114	0.097
83	3.350	0.000	-0.114	-0.001	0.159	0.041
84	0.276	0.001	0.093	-0.002	0.018	-0.072
85	2.608	0.000	-0.037	-0.002	0.196	-0.007
86	3.073	0.000	-0.101	-0.001	0.179	0.045
87	4.086	0.000	-0.149	-0.001	0.178	0.076
88	2.471	0.000	-0.077	-0.001	0.161	0.069
89	4.984	0.000	-0.226	-0.001	0.107	0.138
90	0.744	0.001	0.053	-0.002	-0.069	-0.075
91	4.154	0.000	-0.132	-0.002	0.183	0.022
92	4.038	0.000	-0.141	-0.001	0.203	0.052
93	2.698	0.000	-0.071	-0.001	0.137	0.095
94	3.634	0.000	-0.148	-0.001	0.187	0.057
95	1.102	0.000	0.053	-0.001	0.012	-0.109
96	1.480	0.001	-0.009	-0.001	0.059	0.066
97	1.278	0.000	-0.035	0.000	0.187	0.046
98	1.117	0.001	0.040	-0.002	-0.055	-0.050
99	-0.048	0.001	0.016	0.000	0.084	0.059
100	3.123	0.000	-0.086	-0.002	0.094	0.114
101	1.180	0.000	0.001	0.000	0.022	-0.236
102	2.668	0.001	-0.117	-0.001	0.153	0.112
103	1.806	0.000	-0.035	-0.001	0.090	-0.083
104	2.381	0.001	-0.122	-0.001	0.112	0.195
105	3.307	0.000	-0.090	-0.002	0.069	-0.087
106	2.649	0.001	-0.129	-0.001	0.130	0.126
107	2.050	0.000	-0.075	0.000	-0.004	0.001
108	1.003	0.000	-0.057	0.000	-0.029	-0.022
109	2.854	0.000	-0.101	-0.001	-0.016	0.038
110	2.893	0.000	-0.100	-0.001	-0.029	0.009
111	1.754	0.000	-0.039	-0.001	0.037	-0.199
112	1.105	0.000	-0.006	0.000	0.090	-0.135
113	1.151	0.000	0.002	-0.001	0.121	-0.143
114	2.085	0.000	-0.100	0.000	-0.131	-0.043

115	0.969	0.000	-0.022	0.001	-0.026	-0.158
116	1.668	0.000	-0.046	-0.001	-0.051	-0.146
117	2.527	0.000	-0.114	0.000	-0.091	-0.109
118	1.613	0.000	-0.075	0.001	-0.031	-0.029
119	2.412	0.000	-0.080	-0.001	0.019	-0.051
120	0.357	0.000	0.024	0.000	0.050	-0.085

**Table A4. T-stat estimates – Dependent Variable: Cotton Yield.**

subwatershed	constant	rain	tmp	etm	elnino	lanina
1	2.601	-1.445	-1.306	-1.257	-0.365	0.807
2	3.173	1.237	-0.053	-3.911	-0.070	-0.994
3	4.225	-1.699	-0.303	-3.812	-0.373	-0.918
4	3.408	-1.951	-1.588	-1.635	0.139	0.630
5	3.207	-2.263	-0.977	-2.333	0.016	0.627
6	0.383	0.406	0.874	-1.330	0.907	-1.162
7	0.861	0.921	-0.139	-0.617	0.590	-0.525
8	0.872	2.030	0.741	-2.654	0.658	-0.211
9	2.972	2.191	-0.100	-4.265	-1.011	-1.145
10	1.529	1.304	0.044	-2.241	-0.203	-0.898
11	0.451	2.576	3.434	-4.568	1.162	0.574
12	0.436	2.506	3.407	-4.496	1.008	0.461
13	2.067	-0.244	-0.809	-0.983	0.319	-0.111
14	0.858	1.096	-0.013	-0.828	0.430	-0.764
15	0.855	0.947	-0.147	-0.597	0.632	-0.482
16	1.409	1.871	2.977	-4.748	-0.914	-1.233
17	-0.289	1.428	4.266	-5.161	-0.527	-1.921
18	3.087	-0.309	-1.032	-3.194	-0.013	-0.914
19	3.201	0.068	-1.237	-3.254	-0.016	-0.811
20	-0.011	0.847	0.480	0.181	1.885	-1.136
21	2.221	-0.653	-0.695	-1.230	-0.259	-1.168
22	1.627	2.310	-1.316	-0.509	0.732	1.215
23	1.551	3.079	-0.283	-2.895	0.590	-0.117
24	-0.099	-0.775	0.352	1.573	-1.246	-1.845
25	-0.218	-1.183	0.468	2.061	-1.558	-2.307
26	1.542	1.300	2.771	-4.712	-1.061	-1.223
27	-0.375	0.965	4.227	-5.833	-0.752	-2.210
28	2.130	1.268	-1.146	-1.133	1.075	0.127
29	2.866	-0.201	-1.166	-2.537	0.258	-0.571
30	-0.134	-1.218	0.376	1.981	-1.548	-2.069
31	2.844	-0.210	-1.087	-2.609	0.173	-0.688

32	-0.220	-1.506	0.390	2.440	-1.418	-1.806
33	2.177	-0.047	-1.203	-1.509	3.010	0.678
34	-0.106	-1.439	0.334	2.227	-1.508	-2.002
35	2.677	1.796	-1.247	-2.517	0.197	-0.452
36	2.225	1.513	-0.719	-2.160	-0.474	-1.804
37	2.864	1.151	-0.125	-4.687	1.285	-0.300
38	3.602	1.529	-1.044	-4.902	1.496	-0.266
39	2.831	1.226	-0.209	-4.478	1.282	-0.421
40	1.600	0.967	-1.243	0.041	0.700	0.369
41	2.857	1.250	-1.686	-2.234	1.591	0.198
42	5.633	-0.605	0.174	-0.478	0.426	1.388
43	2.976	1.589	-1.225	-3.557	1.479	-0.225
44	2.208	0.046	-1.238	-1.528	2.918	0.665
45	2.787	1.117	-1.407	-2.540	1.652	0.139
46	-0.342	0.190	1.301	-0.592	1.801	-1.423
47	2.480	1.981	-1.267	-2.132	0.429	-0.435
48	2.832	1.249	-1.499	-2.487	1.562	0.116
49	1.107	2.035	0.309	-2.597	-0.477	-1.448
50	0.811	1.426	0.285	-1.721	-0.077	-1.148
51	0.748	1.489	0.255	-1.543	-0.075	-1.019
52	0.306	1.149	0.403	-0.709	-0.196	-1.183
53	2.467	0.099	-1.515	-1.503	3.183	0.723
54	1.340	2.691	-0.546	-1.726	0.064	-1.075
55	3.046	3.603	-1.515	-4.418	-0.914	-0.690
56	4.286	1.975	-1.515	-6.153	-1.313	-2.158
57	2.633	2.649	-1.836	-1.873	0.699	-0.595
58	3.603	3.067	-0.654	-6.300	-1.871	-2.168
59	0.107	-0.939	0.207	1.684	-1.504	-1.975
60	0.420	1.191	0.194	-0.616	0.048	-0.945
61	-0.143	-1.254	0.380	2.211	-1.318	-1.855
62	0.390	4.413	0.722	-2.741	-0.219	-0.409
63	3.806	1.993	-2.322	-2.977	-0.056	-0.874
64	2.505	1.192	-1.091	-2.068	-0.739	-1.383
65	2.526	1.649	-1.189	-2.353	1.406	1.238
66	2.378	1.088	-1.582	-1.128	-0.558	-1.092
67	2.213	3.688	-1.549	-2.662	-0.125	-0.064
68	2.574	1.528	-1.531	-1.769	1.053	0.548
69	2.075	1.107	-0.477	-2.772	1.366	-0.089
70	0.954	1.372	0.163	-1.550	-0.334	-1.300
71	2.099	2.694	-1.324	-1.752	1.232	1.404
72	3.391	2.992	-2.368	-2.529	1.068	1.259

73	0.029	-1.335	1.151	-1.001	-0.019	-1.342
74	0.926	-1.356	0.734	-1.570	0.423	-0.833
75	3.932	-0.258	-0.592	-3.787	-1.131	-1.777
76	3.923	-0.162	-1.592	-2.643	-0.839	-1.468
77	2.263	1.758	-1.371	-1.637	1.679	0.393
78	2.432	1.865	-1.508	-1.743	1.649	0.264
79	0.221	4.736	0.944	-2.669	-0.024	-0.763
80	2.863	2.304	-1.642	-2.403	1.102	0.916
81	3.279	0.223	0.335	1.461	-0.599	-0.254
82	2.980	2.240	-1.750	-2.414	1.137	0.887
83	2.485	1.719	-1.546	-1.745	1.443	0.359
84	0.173	4.323	1.079	-2.476	0.157	-0.614
85	1.914	1.357	-0.524	-2.143	1.673	-0.060
86	2.292	1.928	-1.388	-1.726	1.628	0.391
87	3.227	2.101	-2.196	-2.385	1.755	0.728
88	2.177	1.929	-1.350	-1.536	1.395	0.585
89	3.636	2.728	-2.909	-2.482	1.107	1.305
90	0.396	3.204	0.533	-2.054	-0.554	-0.565
91	3.252	0.818	-1.850	-1.924	1.426	0.169
92	2.909	0.808	-1.969	-1.399	1.561	0.395
93	2.235	1.620	-1.075	-1.902	1.212	0.776
94	2.619	0.470	-2.036	-0.684	1.418	0.424
95	0.903	-1.561	0.594	-1.164	0.091	-0.836
96	0.878	2.796	-0.100	-1.554	0.497	0.531
97	1.181	1.572	-0.634	-0.389	1.617	0.382
98	0.664	3.409	0.450	-2.451	-0.485	-0.413
99	-0.040	2.519	0.257	-0.292	0.812	0.562
100	2.503	1.572	-1.333	-2.174	0.855	0.952
101	0.761	0.983	0.011	-0.594	0.185	-1.902
102	1.793	3.589	-1.704	-1.315	1.495	1.054
103	1.316	0.474	-0.495	-0.673	0.858	-0.772
104	1.471	2.971	-1.596	-0.668	1.025	1.703
105	2.494	1.549	-1.339	-2.153	0.679	-0.850
106	1.785	3.974	-1.867	-1.170	1.274	1.194
107	2.083	-0.205	-1.470	-0.355	-0.041	0.010
108	0.735	0.707	-0.776	0.409	-0.312	-0.225
109	3.022	0.511	-2.057	-1.207	-0.170	0.388
110	3.024	0.509	-2.019	-1.232	-0.316	0.088
111	1.273	1.253	-0.549	-0.737	0.349	-1.821
112	0.760	0.941	-0.069	-0.563	0.760	-1.101
113	0.822	2.126	0.025	-1.375	1.062	-1.213

114	1.748	0.729	-1.726	-0.168	-1.349	-0.434
115	0.783	-1.042	-0.307	0.641	-0.271	-1.591
116	1.570	2.134	-0.831	-0.762	-0.434	-1.225
117	2.252	-0.235	-2.107	-0.053	-0.997	-1.178
118	1.395	-0.550	-1.177	0.664	-0.327	-0.296
119	2.111	-0.011	-1.267	-0.912	0.203	-0.522
120	0.286	-0.764	0.342	0.369	0.469	-0.791

**Table A5. Parameter estimates – Dependent Variable: Soybean Yield.**

subwatershed	constant	rain	tmp	etm	elnino	lanina
1	3.146	-0.002	0.092	0.000	-0.393	-0.097
2	11.340	-0.001	-0.089	-0.009	-0.237	-0.285
3	4.830	-0.001	0.101	-0.004	-0.433	-0.198
4	3.023	-0.002	0.082	0.000	-0.379	-0.089
5	3.089	-0.002	0.087	0.000	-0.389	-0.095
6	5.927	-0.002	0.037	-0.003	-0.433	-0.069
7	2.825	0.000	0.247	-0.006	-0.296	-0.110
8	4.712	0.001	0.231	-0.008	-0.369	-0.110
9	4.421	0.000	0.024	-0.004	-0.266	0.131
10	2.507	0.000	0.267	-0.006	-0.306	-0.095
11	5.165	0.000	0.708	-0.015	-0.215	-0.436
12	4.849	0.000	0.725	-0.014	-0.240	-0.468
13	4.834	0.000	0.187	-0.007	-0.329	-0.096
14	4.566	0.001	0.214	-0.007	-0.391	-0.179
15	4.617	0.001	0.268	-0.008	-0.420	-0.134
16	4.904	0.000	0.717	-0.014	-0.316	-0.642
17	3.810	0.000	0.777	-0.013	-0.287	-0.497
18	8.050	-0.001	-0.058	-0.005	-0.184	-0.240
19	8.501	-0.001	-0.068	-0.005	-0.124	-0.150
20	9.093	0.000	-0.157	-0.005	-0.183	-0.367
21	0.809	-0.001	0.106	-0.001	-0.122	0.180
22	0.806	-0.001	0.111	-0.001	-0.145	0.131
23	17.202	-0.003	-0.098	-0.011	-0.201	-0.385
24	0.055	0.000	-0.025	0.001	-0.006	-0.003
25	0.063	0.000	-0.023	0.001	-0.007	0.003
26	6.457	0.000	0.828	-0.017	-0.402	-0.654
27	3.497	0.000	0.920	-0.014	-0.159	-0.325
28	9.011	-0.002	-0.314	0.000	-0.457	-0.243
29	7.704	-0.001	-0.007	-0.005	-0.203	-0.236
30	-0.065	0.001	-0.021	0.001	-0.002	-0.013

31	7.702	-0.001	-0.012	-0.005	-0.194	-0.224
32	0.185	0.001	-0.031	0.000	0.006	-0.002
33	15.155	-0.002	-0.348	-0.006	0.012	-0.353
34	-0.063	0.001	-0.022	0.001	-0.002	-0.013
35	14.770	0.000	-0.334	-0.007	-0.724	-0.879
36	15.641	0.001	-0.275	-0.011	-1.070	-0.892
37	10.650	0.000	-0.032	-0.008	-0.258	-0.788
38	3.420	0.000	-0.132	0.000	0.070	0.151
39	10.567	0.000	-0.014	-0.009	-0.292	-0.824
40	-2.680	-0.003	0.057	0.011	0.054	-0.607
41	2.704	0.000	-0.199	0.002	0.092	0.107
42	3.205	0.000	-0.206	0.001	0.132	0.179
43	3.179	0.000	-0.142	0.000	0.096	0.156
44	15.373	-0.002	-0.360	-0.006	0.026	-0.323
45	3.079	0.000	-0.142	0.000	0.097	0.164
46	8.506	0.000	-0.149	-0.005	-0.166	-0.462
47	13.216	0.000	-0.285	-0.007	-0.824	-0.895
48	3.215	0.000	-0.175	0.001	0.147	0.196
49	0.039	0.000	-0.081	0.003	0.214	0.298
50	14.202	-0.002	-0.167	-0.008	-0.749	-0.823
51	14.038	-0.002	-0.190	-0.007	-0.701	-0.811
52	10.011	-0.002	-0.224	-0.003	-0.343	-0.606
53	16.629	-0.002	-0.386	-0.007	0.086	-0.203
54	0.314	0.000	-0.067	0.002	0.170	0.240
55	0.665	-0.001	0.265	-0.002	-0.170	-0.860
56	15.685	0.000	-0.106	-0.013	-0.720	-1.193
57	2.337	0.000	-0.168	0.001	0.121	0.273
58	14.549	0.000	-0.076	-0.013	-0.672	-1.133
59	0.582	0.001	-0.059	0.000	0.026	0.005
60	11.349	-0.001	-0.253	-0.005	-0.347	-0.627
61	0.412	0.001	-0.050	0.000	0.021	0.007
62	10.038	0.001	-0.082	-0.009	-0.344	-0.664
63	2.274	0.000	-0.164	0.001	0.109	0.267
64	15.391	0.000	-0.354	-0.008	-0.797	-0.911
65	18.615	-0.001	-0.614	-0.006	-0.159	-0.563
66	15.559	0.000	-0.350	-0.008	-0.835	-0.929
67	0.761	0.000	0.208	-0.002	-0.238	-0.766
68	2.180	-0.001	0.028	0.000	0.104	-0.178
69	5.828	0.000	-0.030	-0.003	-0.135	-0.682
70	12.858	0.001	-0.210	-0.010	-0.668	-0.833
71	13.347	0.000	-0.487	-0.004	-0.039	-0.311

72	1.384	0.000	-0.188	0.003	0.182	0.257
73	3.660	0.000	-0.240	0.002	-0.281	-0.003
74	4.775	0.000	0.088	-0.003	-0.518	-0.041
75	13.923	0.000	0.047	-0.013	-1.132	-1.521
76	12.915	0.000	-0.120	-0.009	-0.909	-1.298
77	12.318	0.000	-0.397	-0.005	-0.231	-0.683
78	11.842	0.000	-0.364	-0.005	-0.263	-0.718
79	10.293	0.002	0.042	-0.013	-0.427	-0.783
80	1.136	0.000	-0.147	0.003	0.119	0.291
81	-0.001	0.000	0.000	0.000	0.000	0.000
82	1.074	0.000	-0.144	0.003	0.119	0.289
83	12.817	0.000	-0.438	-0.004	-0.184	-0.638
84	12.183	0.002	-0.005	-0.014	-0.521	-0.909
85	7.374	0.000	0.136	-0.009	-0.403	-0.950
86	12.247	0.000	-0.397	-0.005	-0.226	-0.676
87	9.067	-0.001	-0.333	0.000	-0.279	-0.852
88	6.937	-0.001	-0.247	-0.001	0.073	-0.195
89	17.440	0.001	-0.419	-0.012	-0.254	-0.288
90	12.286	0.001	-0.277	-0.008	-0.218	-0.629
91	21.346	0.000	-0.639	-0.010	-0.513	-0.425
92	21.207	0.000	-0.601	-0.011	-0.656	-0.652
93	19.210	-0.001	-0.635	-0.007	-0.126	-0.459
94	20.170	0.000	-0.645	-0.009	-0.514	-0.549
95	5.780	0.000	0.058	-0.004	-0.542	-0.124
96	15.142	0.000	-0.319	-0.010	-0.306	-0.773
97	9.078	0.001	-0.052	-0.008	-0.297	-0.483
98	15.478	0.000	-0.348	-0.010	-0.320	-0.790
99	2.174	0.001	0.239	-0.006	-0.339	-0.692
100	16.643	-0.001	-0.474	-0.008	-0.181	-0.682
101	12.917	0.000	-0.379	-0.007	-0.305	-0.526
102	19.022	0.000	-0.625	-0.008	-0.175	-0.473
103	13.975	-0.001	-0.368	-0.006	-0.282	-0.739
104	15.001	-0.001	-0.501	-0.005	-0.263	-0.603
105	15.367	-0.001	-0.317	-0.008	-0.410	-0.949
106	19.113	0.000	-0.604	-0.009	-0.185	-0.542
107	5.863	0.000	-0.205	-0.002	0.177	0.039
108	2.377	0.000	-0.069	-0.001	0.084	-0.063
109	9.993	0.000	-0.346	-0.004	0.144	-0.154
110	7.591	0.000	-0.193	-0.005	0.153	-0.341
111	20.149	0.001	-0.603	-0.011	-0.266	-0.277
112	11.321	-0.001	-0.424	-0.003	-0.266	-0.599



113	14.164	-0.001	-0.376	-0.005	-0.457	-0.866
114	2.539	0.000	-0.068	-0.001	0.036	-0.007
115	3.930	-0.001	-0.172	0.000	-0.056	-0.187
116	8.584	-0.002	-0.191	-0.001	-0.451	-0.882
117	2.508	0.000	-0.056	-0.001	-0.002	-0.041
118	1.342	0.000	-0.051	0.001	0.095	-0.074
119	2.695	-0.001	-0.109	0.000	0.013	-0.160
120	2.561	0.000	-0.094	0.000	0.054	-0.085

**Table A6. T-stat estimates – Dependent Variable: Soybean Yield.**

subwatershed	constant	rain	tmp	etm	elnino	lanina
1	0.605	-2.538	0.313	-0.187	-1.089	-0.251
2	4.079	-1.434	-0.588	-4.294	-0.990	-1.106
3	0.866	-1.920	0.329	-1.111	-1.162	-0.495
4	0.598	-2.509	0.286	-0.124	-1.081	-0.236
5	0.603	-2.514	0.303	-0.174	-1.096	-0.250
6	1.198	-2.456	0.131	-1.353	-1.238	-0.181
7	0.739	0.480	1.048	-3.002	-0.978	-0.327
8	1.316	0.924	1.024	-4.629	-1.274	-0.342
9	1.607	-0.413	0.149	-1.850	-1.053	0.494
10	0.649	0.573	1.120	-2.954	-1.001	-0.277
11	1.685	4.133	3.351	-6.578	-0.755	-1.456
12	1.554	4.112	3.340	-6.186	-0.831	-1.531
13	1.421	0.803	0.875	-4.279	-1.198	-0.315
14	1.313	1.001	0.986	-4.488	-1.404	-0.578
15	1.244	0.980	1.141	-4.763	-1.393	-0.400
16	1.350	2.375	3.045	-5.365	-0.973	-1.859
17	1.162	3.860	3.444	-6.208	-0.940	-1.544
18	1.705	-1.544	-0.222	-1.702	-0.528	-0.600
19	1.830	-1.646	-0.261	-1.857	-0.364	-0.384
20	1.840	-0.554	-0.549	-2.414	-0.483	-0.895
21	0.223	-1.118	0.510	-0.352	-0.442	0.622
22	0.226	-1.116	0.541	-0.391	-0.528	0.458
23	3.371	-1.528	-0.307	-3.143	-0.337	-0.613
24	0.068	0.250	-0.485	1.222	-0.082	-0.034
25	0.076	0.421	-0.448	0.968	-0.089	0.042
26	1.485	2.502	3.029	-5.990	-1.041	-1.592
27	0.937	3.729	3.727	-7.634	-0.456	-0.886
28	2.384	-2.056	-1.527	-0.172	-1.208	-0.599
29	1.602	-1.431	-0.025	-1.847	-0.567	-0.576

30	-0.087	0.984	-0.458	0.735	-0.036	-0.177
31	1.611	-1.447	-0.045	-1.820	-0.543	-0.548
32	0.221	1.106	-0.591	0.211	0.080	-0.023
33	2.396	-2.115	-1.097	-1.862	0.024	-0.693
34	-0.086	0.987	-0.460	0.732	-0.036	-0.176
35	2.566	-0.270	-1.219	-1.957	-1.428	-1.661
36	2.998	0.888	-1.064	-3.501	-2.260	-1.800
37	1.772	-0.048	-0.102	-2.540	-0.508	-1.521
38	2.477	-1.033	-1.863	-0.073	0.602	1.256
39	1.710	0.016	-0.044	-2.517	-0.561	-1.546
40	-0.462	-2.819	0.155	3.950	0.108	-1.107
41	2.325	0.743	-3.273	2.241	0.927	1.048
42	2.666	0.497	-3.277	1.448	1.286	1.696
43	2.261	-0.868	-1.946	0.389	0.804	1.278
44	2.417	-2.116	-1.125	-1.850	0.051	-0.629
45	2.214	-0.814	-1.974	0.554	0.822	1.356
46	1.617	-0.538	-0.490	-1.887	-0.409	-1.060
47	2.193	-0.271	-0.971	-1.644	-1.510	-1.568
48	2.486	-0.155	-2.581	0.748	1.325	1.718
49	0.027	-1.092	-1.071	3.678	2.099	2.743
50	2.475	-2.766	-0.526	-2.741	-1.755	-1.822
51	2.516	-2.861	-0.618	-2.588	-1.687	-1.847
52	1.948	-2.509	-0.818	-1.178	-0.934	-1.550
53	2.532	-2.095	-1.159	-2.070	0.163	-0.378
54	0.218	-1.429	-0.917	2.711	1.732	2.302
55	0.086	-0.852	0.689	-0.444	-0.332	-1.614
56	2.060	-0.179	-0.286	-3.234	-1.505	-2.370
57	1.788	-0.771	-2.659	1.750	1.030	2.225
58	1.973	-0.120	-0.211	-3.132	-1.448	-2.327
59	0.650	1.203	-1.050	0.189	0.333	0.059
60	2.153	-2.201	-0.920	-1.607	-0.956	-1.622
61	0.492	1.171	-0.938	0.330	0.280	0.088
62	1.114	1.119	-0.174	-1.957	-0.599	-1.082
63	1.684	-0.695	-2.523	1.693	0.896	2.115
64	2.589	-0.078	-1.252	-2.006	-1.524	-1.670
65	2.830	-0.916	-1.805	-1.551	-0.280	-0.927
66	2.576	-0.042	-1.219	-2.042	-1.573	-1.675
67	0.106	-0.331	0.550	-0.500	-0.500	-1.540
68	0.494	-0.765	0.129	-0.070	0.230	-0.378
69	1.047	-0.469	-0.104	-1.008	-0.287	-1.418
70	1.914	0.701	-0.599	-2.836	-1.483	-1.770

71	2.041	-0.088	-1.318	-1.177	-0.072	-0.537
72	1.126	-1.282	-2.732	4.608	1.813	2.378
73	1.701	-2.876	-1.390	1.309	-1.277	-0.012
74	1.283	-3.428	0.304	-1.730	-1.373	-0.102
75	3.087	-0.074	0.185	-4.335	-2.420	-3.029
76	2.623	-0.256	-0.444	-2.825	-1.796	-2.378
77	1.778	0.188	-1.083	-1.272	-0.432	-1.233
78	1.680	0.262	-0.978	-1.285	-0.485	-1.278
79	1.063	1.587	0.083	-2.621	-0.700	-1.205
80	1.000	-1.076	-2.587	3.940	1.256	2.858
81	-0.418	1.723	0.310	2.771	0.519	0.319
82	0.941	-1.167	-2.522	3.967	1.252	2.830
83	1.908	0.078	-1.232	-1.219	-0.355	-1.187
84	1.193	1.519	-0.011	-2.444	-0.863	-1.418
85	1.047	0.428	0.373	-2.277	-0.676	-1.558
86	1.770	0.188	-1.085	-1.246	-0.425	-1.223
87	1.099	-0.864	-0.773	0.086	-0.445	-1.302
88	1.924	-0.851	-1.352	-0.390	0.194	-0.496
89	2.208	1.376	-0.973	-3.938	-0.523	-0.529
90	1.683	0.709	-0.759	-1.873	-0.490	-1.315
91	5.169	-0.065	-2.977	-4.237	-1.393	-1.107
92	4.205	-0.027	-2.370	-3.376	-1.523	-1.466
93	3.330	-0.684	-2.135	-2.119	-0.254	-0.868
94	4.691	0.008	-2.935	-3.446	-1.376	-1.422
95	1.541	-3.291	0.200	-1.934	-1.428	-0.307
96	2.308	0.322	-0.965	-2.642	-0.727	-1.750
97	2.097	0.631	-0.246	-2.720	-0.695	-1.100
98	2.279	0.439	-1.017	-2.592	-0.743	-1.749
99	0.304	0.544	0.625	-1.376	-0.561	-1.114
100	2.901	-0.657	-1.729	-1.996	-0.402	-1.416
101	1.659	0.201	-1.015	-1.242	-0.600	-0.980
102	2.924	0.005	-1.917	-2.530	-0.373	-0.947
103	2.992	-1.040	-1.452	-2.007	-0.763	-1.918
104	2.395	-0.735	-1.666	-1.465	-0.619	-1.336
105	2.536	-0.948	-0.968	-2.022	-0.859	-1.907
106	2.692	0.137	-1.708	-2.484	-0.369	-1.010
107	3.123	-0.239	-1.937	-1.897	0.895	0.191
108	1.209	0.111	-0.651	-1.025	0.639	-0.457
109	3.763	-0.070	-2.429	-1.814	0.530	-0.554
110	2.639	-0.512	-1.287	-1.696	0.545	-1.163
111	2.940	0.739	-1.783	-2.936	-0.574	-0.548

112	2.605	-1.133	-1.638	-1.104	-0.773	-1.666
113	2.391	-1.111	-1.038	-1.622	-0.959	-1.738
114	1.662	-1.143	-0.901	-0.655	0.280	-0.055
115	1.920	-1.545	-1.495	0.075	-0.368	-1.175
116	2.079	-1.659	-0.886	-0.275	-0.998	-1.914
117	1.611	-1.063	-0.744	-0.817	-0.012	-0.320
118	0.784	-1.287	-0.546	0.455	0.688	-0.523
119	1.522	-1.930	-1.138	0.415	0.089	-1.079
120	1.661	-1.320	-1.108	-0.225	0.426	-0.654

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## NITROGEN LOSS

**Table A7. Parameter estimates – Dependent Variable: N-loss, Land Use: Corn.**

Subwatershed	constant	rain	tmp	elnino	lanina
1	20.823	0.191	-10.772	12.929	14.113
2	-182.606	0.194	2.566	10.494	17.876
3	-14.465	0.184	-7.686	11.109	11.908
4	24.469	0.187	-10.209	11.880	11.482
5	15.832	0.187	-10.333	12.555	14.047
6	-93.823	0.195	-3.221	4.322	-8.374
7	-41.382	0.187	-7.936	10.903	4.718
8	-71.716	0.177	-5.433	9.386	4.943
9	-201.605	0.180	3.797	3.323	3.545
10	-77.489	0.130	-0.860	8.401	7.664
11	781.393	-0.005	-28.894	9.009	31.447
12	789.069	-0.005	-29.365	9.297	32.367
13	-40.319	0.164	-6.132	2.371	6.496
14	-58.291	0.178	-6.469	9.740	6.139
15	-59.230	0.179	-6.188	9.245	4.207
16	766.849	-0.005	-30.688	0.826	19.700
17	808.887	-0.006	-30.178	4.046	33.811
18	-108.342	0.165	-2.253	6.514	10.210
19	-90.580	0.147	-1.831	13.131	9.985
20	-91.230	0.158	-2.702	0.471	-2.411
21	78.210	0.131	-8.852	2.166	-3.761
22	66.761	0.138	-7.777	0.095	-4.842
23	-0.293	0.102	-5.463	-1.613	3.298
24	-1.129	0.001	0.061	-0.028	0.134
25	-2.445	0.001	0.148	-0.055	0.268
26	752.702	-0.006	-29.494	3.919	27.617
27	746.541	-0.007	-28.065	5.339	28.328
28	-176.679	0.154	4.368	5.176	-12.237
29	-212.640	0.179	4.472	0.914	-4.106
30	-0.366	0.000	0.020	-0.008	0.046
31	-236.066	0.171	7.328	6.502	-1.253
32	-0.494	0.000	0.027	-0.010	0.065
33	-267.470	0.176	8.926	6.560	-11.147
34	-0.366	0.000	0.020	-0.008	0.045
35	-269.433	0.168	9.624	1.300	-14.068

36	-233.509	0.151	8.218	2.865	-14.359
37	-36.522	0.138	-4.181	12.196	1.833
38	-141.860	0.169	0.707	6.670	-0.748
39	-84.989	0.161	-2.433	13.680	0.754
40	-118.708	0.089	3.948	6.595	12.251
41	-101.412	0.093	2.885	3.580	-0.988
42	-140.913	0.109	4.514	2.801	-1.740
43	-142.406	0.168	0.775	6.176	-0.873
44	-312.654	0.185	10.162	-1.792	-13.049
45	-141.029	0.166	0.883	5.852	-1.195
46	-96.492	0.165	-1.625	6.954	-1.339
47	-296.852	0.182	10.405	2.284	-5.659
48	-216.219	0.150	7.302	5.251	-8.759
49	-396.963	0.191	17.109	0.168	-17.416
50	-330.701	0.189	12.793	1.136	-13.808
51	-338.604	0.191	13.185	2.026	-13.878
52	-232.141	0.174	7.551	-4.112	-17.271
53	-383.607	0.191	15.354	4.846	-10.524
54	-333.242	0.150	15.073	3.285	-12.801
55	-263.200	0.113	12.025	7.551	7.103
56	-183.176	0.140	4.673	8.254	-0.104
57	-297.587	0.158	11.864	2.530	-9.083
58	-197.772	0.137	5.745	9.511	1.391
59	-0.600	0.000	0.032	-0.013	0.076
60	39.561	0.117	-6.845	8.348	-1.547
61	-3.047	0.003	0.168	0.066	0.341
62	-195.921	0.127	7.316	1.340	-6.263
63	-293.670	0.151	11.790	5.537	-4.458
64	-253.037	0.152	9.836	0.763	-9.910
65	-289.467	0.186	8.751	1.199	5.169
66	-227.699	0.149	7.931	4.273	-11.661
67	-165.294	0.125	4.169	6.716	6.238
68	-198.576	0.135	7.330	-8.378	-7.231
69	-117.679	0.136	1.622	9.696	0.768
70	131.497	0.100	-12.415	10.625	6.543
71	-252.592	0.139	11.577	1.945	-18.892
72	-284.903	0.132	14.512	-0.638	-17.108
73	518.129	0.013	-16.854	4.279	11.604
74	509.200	0.017	-12.783	11.971	19.369
75	-190.742	0.167	3.959	6.577	-4.495
76	-234.576	0.166	7.208	0.981	-9.548

77	-235.175	0.134	9.682	1.566	-0.524
78	-231.376	0.133	9.508	1.712	-0.549
79	-205.751	0.129	7.829	1.145	-6.543
80	-296.742	0.149	13.202	0.966	-10.950
81	-237.894	0.124	10.649	2.449	-9.230
82	-208.416	0.148	5.336	5.734	-0.013
83	-244.753	0.136	10.267	1.487	-0.974
84	-23.905	0.095	-2.889	0.154	5.322
85	-128.432	0.141	1.999	5.849	-3.700
86	-213.519	0.126	8.536	2.257	0.135
87	-229.695	0.132	9.262	2.894	-1.120
88	-246.205	0.132	9.494	2.216	-2.998
89	-59.655	0.094	-0.652	1.568	3.861
90	-50.558	0.140	-3.140	11.239	0.950
91	-240.982	0.161	6.920	-0.042	-4.328
92	-266.742	0.160	8.739	3.229	-4.652
93	-246.103	0.155	9.386	-0.631	-9.996
94	-231.720	0.153	7.534	1.688	-3.099
95	780.843	0.010	-29.970	39.595	38.389
96	-48.307	0.154	-4.064	19.818	1.803
97	-196.179	0.138	6.531	13.487	0.666
98	-32.981	0.152	-4.789	19.566	1.381
99	-229.453	0.169	9.250	5.602	-11.170
100	-178.078	0.159	4.414	10.389	-4.465
101	-296.758	0.133	12.134	2.022	-9.648
102	-390.582	0.158	17.691	-0.081	-8.421
103	-158.072	0.197	3.369	-5.105	-14.232
104	-385.340	0.176	15.822	7.709	-10.992
105	-111.307	0.194	0.540	-6.429	-15.845
106	-412.659	0.160	18.975	-0.365	-8.719
107	-28.116	0.074	2.217	-5.174	-2.131
108	83.299	0.053	-2.533	-5.879	-0.684
109	-307.548	0.119	14.872	-0.743	-0.076
110	-306.050	0.119	14.772	-0.965	-0.015
111	-249.572	0.145	8.973	-0.858	-13.411
112	-146.615	0.126	3.250	3.564	1.306
113	-295.641	0.159	11.360	2.131	-6.855
114	5.084	0.071	1.258	-8.162	-2.080
115	49.961	0.075	-2.573	-6.857	-0.708
116	-212.674	0.132	7.718	6.022	1.244
117	22.481	0.068	0.590	-11.054	-3.388

118	30.767	0.085	-1.748	-3.078	13.521
119	313.771	0.106	-14.363	-0.636	5.383
120	52.847	0.080	-3.295	6.796	15.621

**Table A8. T-stat estimates – Dependent Variable: N-loss, Land Use: Corn.**

Subwatershed	constant	rain	tmp	elnino	lanina
1	0.214	12.702	-1.620	1.533	1.557
2	-2.580	13.489	0.547	1.407	2.283
3	-0.155	12.726	-1.203	1.371	1.367
4	0.226	11.161	-1.380	1.267	1.139
5	0.174	13.276	-1.661	1.592	1.657
6	-0.690	9.236	-0.346	0.366	-0.660
7	-0.493	15.548	-1.355	1.435	0.557
8	-0.883	15.176	-0.958	1.276	0.603
9	-2.954	15.531	0.800	0.465	0.477
10	-1.205	14.047	-0.192	1.442	1.180
11	3.986	-2.427	-2.251	0.474	1.572
12	4.018	-2.459	-2.283	0.488	1.615
13	-0.549	15.563	-1.197	0.357	0.877
14	-0.723	15.420	-1.150	1.334	0.755
15	-0.712	14.981	-1.066	1.227	0.501
16	6.619	-4.057	-4.045	0.074	1.670
17	4.280	-3.112	-2.439	0.221	1.755
18	-1.078	12.066	-0.345	0.778	1.124
19	-0.881	10.495	-0.274	1.533	1.075
20	-0.911	11.898	-0.416	0.054	-0.256
21	0.672	7.126	-1.117	0.209	-0.342
22	0.509	6.698	-0.872	0.008	-0.391
23	-0.120	7.198	-4.430	-0.464	0.925
24	-0.716	0.644	0.608	-0.197	0.862
25	-0.800	0.430	0.760	-0.201	0.886
26	5.508	-4.104	-3.296	0.296	1.985
27	5.390	-4.544	-3.095	0.398	2.007
28	-1.825	7.256	0.697	0.448	-0.991
29	-1.866	11.561	0.604	0.096	-0.399
30	-0.718	0.685	0.614	-0.175	0.911
31	-2.303	12.221	1.101	0.761	-0.135
32	-0.714	0.731	0.605	-0.160	0.952



33	-2.179	8.856	1.249	0.573	-0.959
34	-0.720	0.687	0.614	-0.178	0.904
35	-2.623	8.308	1.562	0.112	-1.160
36	-2.400	7.906	1.408	0.261	-1.250
37	-0.406	9.913	-0.789	1.402	0.206
38	-1.689	13.041	0.143	0.822	-0.090
39	-0.927	11.371	-0.451	1.544	0.083
40	-1.359	7.663	0.696	0.869	1.488
41	-1.566	9.279	0.757	0.572	-0.154
42	-2.100	10.521	1.143	0.432	-0.262
43	-1.702	13.018	0.157	0.764	-0.105
44	-3.559	12.985	1.987	-0.219	-1.568
45	-1.693	12.871	0.180	0.727	-0.145
46	-0.778	9.990	-0.202	0.646	-0.115
47	-3.487	10.902	2.038	0.238	-0.563
48	-2.500	11.217	1.435	0.629	-1.023
49	-3.643	12.572	2.554	0.019	-1.832
50	-2.939	12.042	1.849	0.123	-1.406
51	-3.056	12.367	1.935	0.223	-1.435
52	-1.790	9.602	0.947	-0.387	-1.526
53	-3.886	11.946	2.672	0.526	-1.126
54	-3.179	10.294	2.338	0.382	-1.399
55	-3.004	9.511	2.146	0.991	0.859
56	-3.213	18.112	1.282	1.666	-0.019
57	-3.910	10.543	2.599	0.295	-1.011
58	-3.577	18.234	1.625	1.980	0.266
59	-0.711	0.724	0.598	-0.166	0.915
60	0.357	7.590	-1.004	0.919	-0.160
61	-1.293	1.924	1.119	0.310	1.465
62	-2.316	12.994	1.414	0.207	-0.905
63	-4.423	11.557	2.959	0.740	-0.568
64	-2.633	8.051	1.706	0.070	-0.873
65	-3.967	15.038	2.044	0.169	0.686
66	-2.317	7.735	1.345	0.386	-1.005
67	-2.361	13.185	0.931	1.104	0.944
68	-3.192	11.001	1.882	-1.055	-0.876
69	-1.470	10.983	0.344	1.254	0.097
70	1.501	8.419	-2.217	1.397	0.792
71	-1.791	6.916	1.348	0.155	-1.402
72	-2.059	6.698	1.722	-0.052	-1.294
73	3.293	3.805	-1.607	0.276	0.691

74	2.310	3.563	-0.870	0.550	0.823
75	-2.247	9.872	0.772	0.696	-0.451
76	-2.826	10.050	1.438	0.106	-0.979
77	-2.380	9.134	1.669	0.183	-0.059
78	-2.347	9.068	1.643	0.201	-0.062
79	-2.384	12.967	1.483	0.174	-0.926
80	-2.841	8.425	2.154	0.095	-1.015
81	-2.539	7.808	1.937	0.269	-0.954
82	-2.863	12.001	1.249	0.810	-0.002
83	-2.448	9.179	1.749	0.172	-0.109
84	-0.422	14.455	-0.833	0.036	1.147
85	-1.630	11.547	0.431	0.768	-0.474
86	-2.299	9.125	1.565	0.281	0.016
87	-2.452	9.521	1.683	0.357	-0.134
88	-3.336	9.082	2.054	0.235	-0.306
89	-0.772	10.771	-0.135	0.266	0.586
90	-0.366	8.777	-0.372	1.065	0.084
91	-3.557	12.449	1.647	-0.006	-0.572
92	-3.880	12.141	2.050	0.433	-0.606
93	-2.312	8.602	1.502	-0.061	-0.909
94	-3.756	12.959	1.970	0.252	-0.450
95	3.577	2.185	-2.059	1.838	1.648
96	-0.312	8.227	-0.424	1.631	0.139
97	-2.503	8.894	1.330	1.348	0.064
98	-0.210	8.027	-0.493	1.590	0.105
99	-1.644	6.343	1.088	0.419	-0.793
100	-1.330	7.015	0.562	0.798	-0.323
101	-3.806	11.575	2.493	0.273	-1.228
102	-4.399	9.990	3.285	-0.010	-0.957
103	-0.989	6.802	0.344	-0.358	-0.957
104	-2.746	7.039	1.859	0.588	-0.790
105	-0.669	6.444	0.053	-0.434	-1.024
106	-4.793	10.413	3.633	-0.045	-1.022
107	-0.329	5.001	0.424	-0.529	-0.213
108	0.763	3.994	-0.375	-0.687	-0.075
109	-3.690	8.223	2.917	-0.078	-0.008
110	-3.682	8.282	2.906	-0.102	-0.002
111	-2.853	11.263	1.643	-0.103	-1.522
112	-1.576	9.349	0.564	0.467	0.164
113	-2.928	10.818	1.815	0.257	-0.791
114	0.068	5.337	0.278	-1.036	-0.259

115	0.565	5.808	-0.469	-0.942	-0.093
116	-4.364	11.955	2.639	0.981	0.200
117	0.284	4.811	0.123	-1.318	-0.397
118	0.321	5.338	-0.295	-0.343	1.473
119	1.739	3.537	-1.286	-0.037	0.310
120	0.522	4.715	-0.526	0.713	1.605

**Table A9. Parameter estimates – Dependent Variable: N-loss, Land Use: Cotton.**

subwatershed	constant	rain	tmp	elnino	lanina
1	-4.840	0.100	-3.993	-2.441	9.631
2	-116.870	0.096	3.772	-11.096	7.769
3	21.360	0.091	-4.900	0.683	7.656
4	3.140	0.095	-3.656	-5.923	6.883
5	-75.030	0.094	1.585	-7.319	9.351
6	67.570	0.103	-9.641	-6.415	16.770
7	54.790	0.099	-8.520	-5.828	10.716
8	-26.480	0.098	-2.997	-12.130	6.976
9	85.740	0.074	-8.895	6.554	31.925
10	-3.580	0.084	-1.895	-8.050	1.583
11	99.050	-0.002	13.630	-61.324	-17.645
12	-16.370	-0.002	20.378	-40.187	-4.823
13	47.560	0.080	-5.345	-4.629	0.722
14	50.600	0.103	-8.580	-6.140	10.813
15	16.050	0.098	-6.178	-6.356	6.149
16	308.410	-0.004	-5.243	1.602	6.011
17	251.110	-0.001	0.644	-15.816	29.036
18	-82.090	0.127	-1.613	2.023	22.636
19	-125.390	0.131	0.620	-4.093	14.840
20	-28.120	0.047	0.257	-2.012	5.599
21	-66.090	0.103	0.578	-11.216	3.589
22	109.390	0.088	-9.271	-10.246	4.233
23	-91.690	0.062	4.114	3.869	1.611
24	112.380	-0.039	-1.655	2.976	-2.286
25	104.310	-0.038	-1.089	2.468	-0.952
26	295.270	-0.004	-3.760	-1.127	16.357
27	185.180	-0.005	3.742	-4.691	23.316
28	-131.180	0.092	4.764	-9.411	9.122
29	-98.770	0.121	0.126	0.648	14.969

30	93.910	-0.013	-0.853	1.302	-0.575
31	-98.670	0.122	-0.132	0.698	15.736
32	94.310	-0.011	-0.922	1.086	-0.322
33	-123.740	0.105	3.779	-20.945	11.081
34	92.330	0.000	-0.979	0.144	-1.807
35	-128.560	0.079	5.803	-15.336	11.132
36	-61.520	0.069	1.222	0.806	17.017
37	-44.940	0.082	0.285	-8.925	4.918
38	-127.730	0.076	5.842	-13.627	1.037
39	-76.390	0.084	2.136	-11.602	1.827
40	-81.700	0.058	5.306	-10.366	3.941
41	-107.480	0.058	3.992	-5.798	4.815
42	86.020	-0.007	0.327	0.103	-0.243
43	-196.100	0.106	7.349	-14.258	2.232
44	-124.660	0.105	3.901	-20.865	10.538
45	-132.610	0.098	3.990	-12.797	2.302
46	-24.530	0.088	-2.353	-4.805	20.185
47	-57.930	0.101	-0.569	-11.329	17.189
48	-175.200	0.092	6.745	-11.929	2.988
49	-15.020	0.096	-2.254	-11.543	7.877
50	2.850	0.108	-4.504	-12.469	10.035
51	-8.920	0.116	-4.137	-13.446	10.249
52	8.410	0.069	-2.130	-8.637	9.709
53	-131.370	0.130	2.263	-22.827	13.501
54	-63.030	0.049	3.045	-11.389	-1.006
55	-67.950	0.080	0.710	3.339	22.978
56	-172.690	0.075	8.259	-1.077	5.878
57	-84.250	0.077	2.675	-9.818	11.469
58	-121.730	0.075	4.943	-1.778	7.181
59	94.480	-0.008	-0.787	0.011	-3.871
60	40.780	0.045	-2.634	-8.019	10.207
61	91.960	-0.015	-0.400	0.369	-4.049
62	-1.710	0.057	-1.312	-6.610	11.389
63	-47.230	0.043	1.482	1.440	11.154
64	-64.760	0.072	1.336	0.716	18.244
65	-112.660	0.098	3.405	-19.806	-6.929
66	-28.150	0.076	-1.241	2.149	21.653
67	-76.610	0.034	6.111	-0.289	6.330
68	72.310	0.035	-2.650	-5.668	1.383
69	-87.590	0.086	1.887	-10.921	6.405
70	-101.640	0.058	4.534	3.209	17.712

71	-126.710	0.100	4.561	-16.826	-6.931
72	-126.310	0.094	4.573	-10.839	2.646
73	40.680	0.006	10.481	7.594	2.334
74	585.290	0.008	-19.769	-44.750	35.952
75	-99.320	0.087	2.189	1.333	20.240
76	-68.740	0.099	-0.766	6.209	22.842
77	-100.650	0.088	2.909	-11.945	4.719
78	-97.690	0.086	2.869	-12.156	3.565
79	-42.460	0.061	0.858	-7.763	14.059
80	-51.460	0.080	0.869	-12.368	-7.127
81	92.200	-0.003	-0.241	0.332	-0.170
82	-50.480	0.079	0.853	-12.267	-7.255
83	-32.230	0.072	-0.511	-9.484	7.349
84	-61.570	0.055	2.341	-4.238	12.043
85	-102.090	0.089	2.486	-11.922	4.558
86	-64.590	0.081	1.027	-11.595	4.739
87	-169.700	0.089	6.977	-12.578	2.768
88	-29.360	0.065	-0.111	-5.583	7.722
89	-127.900	0.064	6.186	-5.648	4.936
90	-14.780	0.042	0.616	-3.434	11.109
91	-211.750	0.087	9.621	-10.189	0.585
92	-206.740	0.108	7.844	-10.105	-2.887
93	-83.670	0.091	2.211	-19.975	-8.834
94	-208.080	0.110	7.764	-10.216	1.224
95	517.460	0.009	-16.402	-29.652	25.433
96	33.570	0.038	-1.902	-2.631	8.838
97	-52.490	0.062	1.243	-4.119	5.534
98	10.940	0.034	-0.038	-1.514	10.970
99	14.640	0.076	-2.609	-2.553	-0.551
100	-152.350	0.059	8.339	-10.044	-2.050
101	-152.270	0.073	6.134	-4.393	11.319
102	-164.570	0.064	8.780	-10.170	-3.163
103	64.300	0.088	-5.755	-18.059	3.062
104	-80.470	0.034	6.159	-7.810	-6.836
105	-34.320	0.089	0.180	-15.002	2.662
106	-147.470	0.059	7.920	-7.066	-1.722
107	19.680	0.037	-0.172	-6.662	12.228
108	98.600	0.007	-1.790	-15.449	1.621
109	69.050	0.069	-3.923	-8.592	11.110
110	72.750	0.068	-4.116	-8.199	10.962
111	-129.130	0.055	6.012	-1.324	4.911

112	-60.590	0.081	0.252	-8.630	11.109
113	35.470	0.094	-6.713	-11.282	9.668
114	2.170	0.016	3.416	-15.953	2.723
115	-27.500	0.039	2.789	-11.374	5.336
116	-7.990	0.086	-3.793	-0.560	14.166
117	50.690	0.014	0.895	-16.536	1.827
118	28.280	0.052	-1.868	-8.871	5.694
119	225.880	0.065	-14.937	-15.293	6.811
120	78.850	0.087	-6.664	-12.851	8.910

**Table A10. Parameter estimates – Dependent Variable: N-loss, Land Use: Cotton.**

subwatershed	constant	rain	tmp	elnino	lanina
1	-0.056	5.399	-0.681	-0.305	1.173
2	-1.541	6.258	0.750	-1.388	0.926
3	0.313	4.738	-1.096	0.081	0.892
4	0.041	4.774	-0.764	-0.693	0.794
5	-0.912	4.795	0.299	-0.847	1.091
6	0.854	8.384	-1.781	-0.934	2.271
7	0.552	6.940	-1.229	-0.648	1.069
8	-0.278	7.169	-0.451	-1.406	0.725
9	1.105	5.610	-1.647	0.805	3.777
10	-0.031	5.038	-0.232	-0.761	0.134
11	0.429	-0.737	0.900	-2.735	-0.748
12	-0.077	-0.735	1.455	-1.937	-0.221
13	0.608	4.446	-0.984	-0.511	0.078
14	0.504	7.132	-1.223	-0.675	1.066
15	0.171	7.262	-0.944	-0.748	0.650
16	1.834	-2.346	-0.476	0.098	0.351
17	1.261	-0.682	0.049	-0.820	1.431
18	-0.798	9.036	-0.241	0.236	2.434
19	-1.222	9.361	0.093	-0.479	1.601
20	-0.442	5.568	0.062	-0.364	0.934
21	-0.623	6.171	0.080	-1.185	0.358
22	1.037	5.313	-1.291	-1.089	0.425
23	-2.240	6.860	1.575	0.783	0.327
24	3.153	-1.831	-0.728	0.925	-0.649
25	2.861	-1.748	-0.469	0.749	-0.264
26	1.905	-2.361	-0.371	-0.075	1.037

27	1.257	-3.475	0.388	-0.329	1.552
28	-2.267	7.269	1.272	-1.362	1.236
29	-0.962	8.652	0.019	0.076	1.613
30	4.703	-1.055	-0.670	0.722	-0.292
31	-0.964	8.744	-0.020	0.082	1.702
32	4.637	-0.870	-0.711	0.591	-0.160
33	-1.495	7.851	0.784	-2.712	1.413
34	4.408	0.039	-0.733	0.076	-0.873
35	-1.750	5.450	1.317	-1.854	1.284
36	-0.938	5.383	0.311	0.109	2.198
37	-0.510	6.036	0.055	-1.048	0.563
38	-1.402	5.427	1.090	-1.549	0.115
39	-0.889	6.321	0.423	-1.399	0.215
40	-0.954	5.059	0.954	-1.393	0.488
41	-1.890	6.557	1.193	-1.056	0.855
42	10.697	-1.751	0.803	0.126	-0.286
43	-2.256	7.919	1.437	-1.698	0.259
44	-1.508	7.808	0.811	-2.706	1.346
45	-1.650	7.888	0.844	-1.648	0.289
46	-0.238	6.413	-0.352	-0.538	2.083
47	-0.667	5.905	-0.109	-1.158	1.677
48	-2.343	7.940	1.533	-1.651	0.403
49	-0.117	5.341	-0.285	-1.093	0.701
50	0.026	7.125	-0.671	-1.393	1.053
51	-0.080	7.512	-0.605	-1.476	1.057
52	0.094	5.532	-0.385	-1.171	1.236
53	-1.303	7.927	0.385	-2.426	1.413
54	-0.757	4.214	0.595	-1.670	-0.139
55	-0.731	6.315	0.120	0.413	2.619
56	-2.162	6.911	1.617	-0.155	0.780
57	-1.001	4.670	0.530	-1.036	1.155
58	-1.405	6.393	0.893	-0.236	0.878
59	2.905	-0.389	-0.380	0.004	-1.204
60	0.455	3.574	-0.478	-1.092	1.305
61	2.836	-0.756	-0.194	0.126	-1.264
62	-0.018	5.303	-0.229	-0.922	1.484
63	-0.740	3.466	0.387	0.200	1.479
64	-0.965	5.465	0.332	0.095	2.303
65	-1.351	6.918	0.696	-2.441	-0.804
66	-0.390	5.338	-0.286	0.264	2.538
67	-0.784	2.593	0.978	-0.034	0.686

68	1.011	2.465	-0.591	-0.620	0.146
69	-1.266	8.050	0.464	-1.635	0.935
70	-1.289	5.437	0.899	0.468	2.381
71	-1.057	5.863	0.625	-1.582	-0.605
72	-0.761	3.967	0.453	-0.736	0.167
73	0.310	2.300	1.196	0.586	0.167
74	1.935	1.322	-0.980	-1.499	1.114
75	-1.428	6.256	0.521	0.172	2.476
76	-0.866	6.278	-0.160	0.702	2.448
77	-0.904	5.310	0.445	-1.240	0.474
78	-0.888	5.242	0.444	-1.277	0.362
79	-0.433	5.405	0.143	-1.035	1.751
80	-0.573	5.240	0.165	-1.417	-0.769
81	9.164	-0.683	-0.573	0.354	-0.179
82	-0.564	5.198	0.162	-1.408	-0.784
83	-0.286	4.275	-0.077	-0.972	0.728
84	-0.698	5.358	0.434	-0.628	1.668
85	-1.496	8.466	0.619	-1.809	0.675
86	-0.589	4.960	0.160	-1.223	0.483
87	-1.594	5.629	1.116	-1.366	0.291
88	-0.562	6.270	-0.034	-0.837	1.114
89	-1.508	6.643	1.166	-0.871	0.683
90	-0.198	4.830	0.135	-0.603	1.821
91	-3.330	7.133	2.440	-1.478	0.082
92	-3.133	8.523	1.917	-1.413	-0.392
93	-1.012	6.520	0.456	-2.483	-1.034
94	-2.940	8.092	1.769	-1.332	0.155
95	2.264	1.792	-1.076	-1.314	1.043
96	0.404	3.743	-0.370	-0.404	1.273
97	-1.074	6.408	0.406	-0.660	0.853
98	0.130	3.318	-0.007	-0.229	1.557
99	0.149	4.019	-0.435	-0.270	-0.055
100	-2.432	5.568	2.268	-1.648	-0.317
101	-2.256	7.324	1.456	-0.686	1.665
102	-2.070	4.536	1.820	-1.369	-0.401
103	0.508	3.830	-0.742	-1.600	0.260
104	-1.252	2.986	1.580	-1.301	-1.073
105	-0.272	3.883	0.023	-1.332	0.227
106	-1.941	4.384	1.719	-0.996	-0.229
107	0.215	2.314	-0.031	-0.636	1.138
108	0.623	0.384	-0.183	-1.246	0.123



109	0.358	2.053	-0.332	-0.389	0.491
110	0.378	2.043	-0.350	-0.373	0.486
111	-2.166	6.261	1.615	-0.234	0.818
112	-0.639	5.916	0.043	-1.109	1.366
113	0.355	6.450	-1.084	-1.374	1.127
114	0.020	0.842	0.521	-1.397	0.234
115	-0.217	2.115	0.355	-1.091	0.490
116	-0.140	6.630	-1.105	-0.078	1.940
117	0.408	0.620	0.118	-1.256	0.136
118	0.227	2.509	-0.242	-0.758	0.476
119	1.609	2.786	-1.719	-1.157	0.504
120	0.353	2.348	-0.482	-0.611	0.415

**Table A11. Parameter estimates – Dependent Variable: N-loss, Land Use: Soybean.**

subwatershed	constant	rain	tmp	elnino	lanina
1	-10.801	0.153	-5.750	1.550	35.507
2	-412.136	0.170	20.573	-4.731	25.487
3	37.897	0.102	-6.344	3.717	27.317
4	-11.093	0.152	-5.578	1.717	35.533
5	-12.868	0.152	-5.491	1.586	35.448
6	-35.511	0.116	-2.409	0.005	24.664
7	-31.707	0.075	0.101	3.427	27.564
8	-18.283	0.090	-2.190	2.952	26.855
9	-32.405	0.076	-0.006	5.543	29.696
10	-81.875	0.081	2.890	0.109	23.314
11	69.957	-0.002	10.429	-24.364	1.957
12	142.712	-0.003	8.702	-23.110	19.099
13	-90.850	0.077	3.669	-1.723	18.018
14	-33.138	0.074	0.238	5.092	28.830
15	-34.903	0.086	-0.735	1.518	25.864
16	13.492	-0.003	14.550	-20.757	7.820
17	148.939	-0.004	8.417	-24.710	18.682
18	-4.756	0.054	-0.143	8.193	26.156
19	-82.962	0.096	1.499	4.600	29.915
20	-74.540	0.065	3.610	10.582	22.443
21	-66.910	0.026	6.074	3.674	15.206
22	15.346	0.027	0.449	2.630	16.260
23	-61.831	0.085	0.223	8.606	9.159
24	92.529	-0.042	0.582	-0.384	-2.978
25	53.315	-0.035	3.140	-4.032	-4.854

26	67.640	-0.002	10.876	-25.301	8.919
27	71.876	-0.002	10.107	-24.535	8.221
28	-270.151	0.114	13.031	4.121	15.999
29	-33.969	0.069	0.489	8.659	29.267
30	107.229	-0.005	-0.968	0.370	-0.861
31	-36.551	0.071	0.496	8.236	29.118
32	103.666	-0.005	-0.626	-0.251	-3.033
33	-223.180	0.103	10.297	3.685	12.122
34	117.755	-0.017	-1.292	1.718	-0.601
35	-137.104	0.085	6.351	-1.140	10.429
36	-108.414	0.085	4.074	2.238	16.541
37	-51.634	0.065	2.278	-1.339	5.487
38	36.300	0.067	-3.029	4.937	11.751
39	-44.020	0.070	1.569	0.442	10.038
40	47.301	0.064	-3.502	17.386	25.481
41	-55.205	0.102	-0.423	1.969	9.456
42	-73.511	0.120	0.149	1.919	14.076
43	-11.584	0.092	-1.626	5.158	15.858
44	-215.417	0.107	9.380	3.549	13.954
45	-23.299	0.095	-1.217	3.683	15.735
46	-158.437	0.075	8.438	7.207	24.848
47	-168.423	0.126	6.090	3.432	28.571
48	-63.242	0.097	1.097	5.199	16.403
49	-143.899	0.091	7.347	7.640	14.560
50	-220.351	0.109	11.194	6.931	21.493
51	-226.713	0.109	11.790	6.366	19.585
52	-148.510	0.088	7.604	1.178	16.354
53	-282.114	0.138	12.207	8.585	26.543
54	15.873	0.056	-1.856	2.649	11.303
55	-500.090	0.105	28.573	10.194	14.866
56	-371.623	0.073	22.244	6.626	11.633
57	-48.820	0.096	0.410	6.100	25.293
58	-373.515	0.074	22.408	7.736	10.963
59	136.765	-0.023	-2.329	2.566	-4.106
60	-52.141	0.050	3.371	-0.591	5.911
61	124.192	-0.040	-1.112	3.168	-3.562
62	-35.085	0.101	-1.559	10.033	26.384
63	-43.944	0.097	-0.041	7.186	28.143
64	-106.388	0.085	4.100	2.274	13.989
65	-198.383	0.123	7.345	6.407	26.137
66	-108.861	0.087	3.952	2.945	15.621

67	-155.592	0.043	11.259	12.182	16.031
68	36.911	0.084	-4.889	1.058	17.447
69	-73.663	0.091	1.860	2.062	19.089
70	-424.996	0.102	23.394	5.888	17.354
71	-216.400	0.130	8.229	-2.045	14.238
72	-236.699	0.145	8.482	-2.417	10.995
73	137.569	-0.006	7.322	-14.113	10.901
74	100.330	-0.007	13.801	-15.868	5.447
75	-107.659	0.089	3.732	2.292	21.896
76	-91.935	0.102	2.255	5.371	30.880
77	-174.980	0.117	6.449	2.347	21.414
78	-155.566	0.116	5.244	2.961	21.562
79	-3.715	0.098	-3.322	10.791	28.426
80	-135.636	0.121	3.810	7.186	23.780
81	51.676	0.015	-0.776	-0.807	-0.075
82	-142.641	0.121	4.266	6.892	23.533
83	-199.155	0.119	7.952	1.191	19.662
84	-8.128	0.081	-2.540	6.399	19.472
85	-77.655	0.087	2.332	2.451	19.799
86	-173.785	0.117	6.332	2.524	20.712
87	-194.282	0.123	6.886	1.595	21.948
88	-4.776	0.058	-1.198	2.141	17.465
89	-136.167	0.105	3.946	3.106	21.621
90	39.497	0.055	-3.362	4.582	16.634
91	-105.620	0.103	2.399	-4.724	9.503
92	-66.818	0.110	-0.201	2.814	21.237
93	-156.098	0.112	5.634	4.602	25.956
94	-94.514	0.118	0.877	2.005	19.360
95	139.348	-0.007	11.024	-17.560	4.179
96	25.322	0.047	-1.781	3.806	11.585
97	43.455	0.045	-2.951	-4.287	9.671
98	50.421	0.045	-3.011	3.539	13.222
99	-107.017	0.086	4.371	4.721	16.634
100	-162.000	0.062	8.865	1.464	10.871
101	29.639	0.043	-1.346	-1.869	12.773
102	-163.373	0.103	6.252	0.690	25.548
103	-177.413	0.072	11.030	-7.504	0.951
104	-185.954	0.053	11.340	-2.070	6.422
105	-174.485	0.080	9.689	-8.563	6.080
106	-224.356	0.112	9.573	1.431	23.247
107	-14.430	0.052	1.418	-7.606	7.853

108	-15.780	0.013	3.546	-0.819	1.022
109	0.557	0.044	1.688	4.572	12.196
110	4.552	-0.007	5.135	-6.583	1.893
111	-80.041	0.094	0.685	4.646	16.610
112	-45.080	0.052	2.106	-0.287	9.101
113	95.347	0.103	-10.056	2.677	30.461
114	11.515	0.005	2.374	-4.372	4.749
115	6.557	0.014	1.749	-3.747	3.059
116	5.343	0.111	-5.047	0.226	16.135
117	28.805	0.002	1.408	-5.680	6.430
118	-102.843	0.039	6.464	-6.032	4.974
119	-101.996	0.030	8.813	-17.780	-11.162
120	-133.356	0.055	7.243	-9.674	6.519

**Table A12. T-stat estimates – Dependent Variable: N-loss, Land Use: Soybean.**

subwatershed	constant	rain	tmp	elnino	lanina
1	-0.061	5.613	-0.478	0.102	2.167
2	-2.714	5.514	2.042	-0.295	1.517
3	0.365	6.298	-0.892	0.412	2.816
4	-0.062	5.475	-0.455	0.110	2.127
5	-0.071	5.448	-0.445	0.101	2.107
6	-0.280	5.878	-0.278	0.000	2.084
7	-0.266	4.402	0.012	0.318	2.293
8	-0.130	4.486	-0.224	0.232	1.895
9	-0.304	4.192	-0.001	0.497	2.562
10	-0.753	5.216	0.381	0.011	2.125
11	0.453	-1.203	1.032	-1.627	0.124
12	0.788	-1.689	0.734	-1.316	1.034
13	-0.780	4.636	0.451	-0.163	1.533
14	-0.230	3.562	0.024	0.390	1.983
15	-0.240	4.132	-0.072	0.115	1.763
16	0.095	-2.122	1.569	-1.514	0.542
17	0.779	-1.842	0.672	-1.333	0.958
18	-0.039	3.216	-0.018	0.802	2.361
19	-0.649	5.488	0.180	0.431	2.588
20	-0.640	4.193	0.478	1.047	2.047
21	-0.566	1.421	0.754	0.348	1.362
22	0.135	1.507	0.058	0.259	1.511
23	-1.136	5.132	0.066	1.347	1.396
24	1.831	-1.387	0.181	-0.084	-0.596

25	1.001	-1.104	0.925	-0.838	-0.922
26	0.385	-1.232	0.944	-1.486	0.498
27	0.381	-0.957	0.819	-1.344	0.428
28	-3.193	6.168	2.379	0.408	1.483
29	-0.261	3.903	0.058	0.799	2.492
30	4.508	-0.351	-0.639	0.172	-0.366
31	-0.287	4.067	0.060	0.776	2.530
32	4.195	-0.354	-0.398	-0.113	-1.242
33	-1.861	5.297	1.475	0.329	1.068
34	4.716	-1.137	-0.811	0.762	-0.244
35	-1.521	4.803	1.175	-0.112	0.980
36	-1.274	5.089	0.798	0.233	1.646
37	-0.563	4.601	0.422	-0.151	0.604
38	0.356	4.244	-0.504	0.501	1.163
39	-0.432	4.467	0.261	0.045	0.994
40	0.437	4.437	-0.498	1.848	2.496
41	-0.682	8.117	-0.089	0.252	1.180
42	-0.768	8.102	0.027	0.208	1.485
43	-0.099	5.038	-0.235	0.454	1.363
44	-1.852	5.670	1.385	0.327	1.266
45	-0.205	5.374	-0.182	0.335	1.397
46	-1.339	4.800	1.099	0.702	2.231
47	-1.420	5.402	0.856	0.257	2.042
48	-0.543	5.388	0.160	0.462	1.423
49	-0.997	4.523	0.828	0.646	1.157
50	-1.395	4.950	1.152	0.535	1.559
51	-1.390	4.779	1.176	0.476	1.376
52	-1.128	4.780	0.939	0.109	1.423
53	-1.916	5.797	1.424	0.625	1.904
54	0.173	4.348	-0.329	0.353	1.413
55	-5.150	7.987	4.602	1.208	1.622
56	-3.648	5.297	3.415	0.748	1.209
57	-0.445	4.451	0.062	0.494	1.952
58	-3.823	5.561	3.587	0.911	1.188
59	3.268	-0.940	-0.873	0.679	-0.993
60	-0.550	3.798	0.578	-0.076	0.714
61	2.724	-1.461	-0.383	0.769	-0.791
62	-0.269	6.695	-0.195	1.006	2.471
63	-0.400	4.510	-0.006	0.580	2.167
64	-1.226	4.993	0.788	0.233	1.365
65	-1.831	6.688	1.156	0.608	2.336

66	-1.249	5.089	0.756	0.300	1.518
67	-1.396	2.854	1.580	1.258	1.523
68	0.464	5.371	-0.981	0.104	1.652
69	-0.710	5.671	0.304	0.206	1.858
70	-4.700	8.286	4.047	0.750	2.035
71	-1.687	7.093	1.054	-0.180	1.162
72	-1.843	7.938	1.085	-0.212	0.896
73	0.993	-1.879	0.793	-1.032	0.737
74	0.531	-1.831	1.096	-0.852	0.270
75	-1.142	4.758	0.656	0.218	1.978
76	-0.870	4.835	0.353	0.457	2.488
77	-1.346	6.066	0.845	0.209	1.841
78	-1.234	6.180	0.709	0.272	1.912
79	-0.028	6.367	-0.408	1.061	2.612
80	-1.300	6.854	0.622	0.708	2.206
81	5.863	10.316	-1.501	-0.942	-0.083
82	-1.356	6.809	0.691	0.673	2.165
83	-1.490	5.994	1.013	0.103	1.643
84	-0.094	8.164	-0.481	0.970	2.756
85	-0.732	5.316	0.374	0.239	1.886
86	-1.363	6.191	0.845	0.229	1.815
87	-1.534	6.528	0.926	0.146	1.937
88	-0.083	5.106	-0.332	0.291	2.286
89	-1.498	10.196	0.693	0.447	2.789
90	0.405	4.854	-0.564	0.615	2.086
91	-1.401	7.161	0.513	-0.578	1.128
92	-0.744	6.370	-0.036	0.289	2.116
93	-1.468	6.216	0.903	0.445	2.363
94	-1.060	6.924	0.159	0.207	1.943
95	0.739	-1.833	0.876	-0.943	0.208
96	0.271	4.206	-0.309	0.520	1.486
97	0.736	3.853	-0.798	-0.569	1.235
98	0.511	3.743	-0.494	0.458	1.606
99	-0.815	3.454	0.547	0.375	1.256
100	-2.044	4.639	1.907	0.190	1.328
101	0.400	3.909	-0.291	-0.266	1.710
102	-1.615	5.722	1.019	0.073	2.549
103	-1.176	2.625	1.192	-0.558	0.068
104	-2.474	3.946	2.488	-0.295	0.862
105	-1.165	2.944	1.054	-0.641	0.436
106	-2.359	6.585	1.660	0.161	2.467

107	-0.119	2.470	0.192	-0.551	0.555
108	-0.151	1.008	0.547	-0.100	0.117
109	0.005	2.261	0.244	0.354	0.920
110	0.037	-0.319	0.674	-0.463	0.130
111	-1.107	8.791	0.152	0.677	2.280
112	-0.441	3.521	0.332	-0.034	1.037
113	0.678	5.054	-1.154	0.232	2.525
114	0.149	0.354	0.505	-0.534	0.569
115	0.071	1.061	0.304	-0.491	0.384
116	0.062	5.687	-0.977	0.021	1.468
117	0.354	0.144	0.285	-0.659	0.732
118	-1.261	2.903	1.280	-0.789	0.637
119	-0.704	1.260	0.983	-1.303	-0.801
120	-1.353	3.360	1.187	-1.042	0.688

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