Land Economics 95(1), February 2019
"Does Large Farm Establishment Create Benefits for Neighboring Smallholders? Evidence from Ethiopia,"
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Appendix

Table A1: Changes in farm characteristics, input use, and rainfall over time

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Panel A: Overall information											
Share of households cultivating											
Maize	0.456	0.564	0.532	0.557	0.575	0.633	0.580	0.573	0.639	0.629	0.594
Teff	0.334	0.378	0.377	0.376	0.423	0.424	0.419	0.424	0.417	0.399	0.414
Sorghum	0.364	0.382	0.401	0.401	0.345	0.378	0.360	0.384	0.380	0.360	0.344
Wheat	0.215	0.252	0.245	0.260	0.277	0.283	0.323	0.296	0.274	0.298	0.290
Input use											
Area cult. (ha)	0.893	1.004	0.831	0.871	0.955	0.977	1.026	0.958	0.966	0.957	0.959
Use fertilizer	0.200	0.222	0.285	0.267	0.365	0.352	0.405	0.442	0.491	0.532	0.544
Distance to & area of large farms > 50 ha											
Dist. to lg. farm	77.7	71.2	59.3	56.2	51.9	46.0	48.6	46.2	42.4	40.9	40.9
# within 25 km	0.37	0.41	0.47	0.60	1.32	1.71	1.81	1.89	2.01	2.20	2.24
# in 25-50 km	0.97	1.17	1.28	1.69	4.06	5.24	5.88	5.79	6.15	6.63	6.79
# in 50-100 km	3.13	4.00	4.73	5.85	17.28	22.41	25.07	25.54	26.84	28.90	29.64
area < 25 km	1.30	1.38	1.93	2.26	4.54	6.15	6.67	6.85	7.00	7.40	7.96
area 25-50 km	3.60	4.20	6.50	7.40	15.40	19.60	22.60	22.90	24.00	24.60	25.60
area 50 - 100 km	18.40	20.60	27.40	31.70	70.00	88.50	98.20	96.80	100.30	104.70	110.00
Rainfall deviation (z-score)											
$1 < z$	0.049	0.000	0.000	0.228	0.174	0.080	0.009	0.388	0.026	0.179	0.400
$0 < z \leq 1$	0.154	0.034	0.000	0.521	0.502	0.499	0.314	0.434	0.174	0.532	0.545
$-1 \leq z < 0$	0.655	0.344	0.557	0.241	0.312	0.405	0.548	0.174	0.461	0.284	0.055
$z < -1$	0.142	0.622	0.443	0.010	0.013	0.016	0.128	0.004	0.339	0.005	0.000
No. of kebeles	487	497	493	513	1930	2041	1489	2002	2044	1968	1982
Panel B: Crop-specific information											
Maize											
Area (ha)	0.16	0.15	0.16	0.17	0.19	0.18	0.09	0.20	0.19	0.19	0.19
Yield (Q/ha)	12.65	13.12	14.97	16.30	18.27	19.24	17.99	22.44	25.23	26.33	27.14
Use fertilizer	0.28	0.36	0.36	0.35	0.41	0.45	0.44	0.46	0.51	0.52	0.53
Sorghum											
Area (ha)	0.33	0.35	0.35	0.34	0.23	0.25	0.18	0.24	0.24	0.22	0.22
Yield (Q/ha)	10.76	12.32	12.89	13.99	15.94	16.63	18.46	19.31	18.84	19.36	21.37
Use fertilizer	0.15	0.18	0.20	0.24	0.16	0.18	0.17	0.21	0.22	0.23	0.22
Teff											
Area (ha)	0.14	0.22	0.23	0.25	0.30	0.29	0.17	0.31	0.30	0.29	0.31
Yield (Q/ha)	5.62	9.31	8.55	8.77	11.78	11.70	11.89	11.66	12.00	12.82	13.39
Use fertilizer	0.19	0.24	0.27	0.29	0.34	0.34	0.37	0.41	0.42	0.41	0.45
Wheat											
Area (ha)	0.13	0.15	0.13	0.24	0.21	0.21	0.09	0.21	0.19	0.21	0.20
Yield (Q/ha)	12.61	14.61	12.89	15.39	15.33	15.92	16.87	16.04	17.40	19.07	20.92
Use fertilizer	0.29	0.33	0.35	0.38	0.39	0.37	0.43	0.41	0.40	0.43	0.43

Source: Own computation from 2003/4-2013/14 CSA smallholder farm surveys.
Note: Sample size is in terms of kebeles and, as explained in the text, a kebele is said to be growing a crop if at least 10% of the households in the kebele are growing the crop. Information on area and application of fertilizer and improved seed are collected at the farm level, but averages are calculated first within kebeles and then over all kebeles. Large farm area is in km^2.

Table A2: Descriptive statistics for smallholders at different distances to large farms

		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Maize												
< 25	%>0	0.100	0.114	0.138	0.167	0.259	0.325	0.329	0.341	0.363	0.366	0.363
	Area	0.495	0.482	0.599	0.666	2.195	2.374	2.545	3.353	3.298	3.546	4.169
25 50	%>0	0.184	0.303	0.328	0.354	0.500	0.582	0.599	0.605	0.634	0.632	0.629
	Area	1.451	1.811	1.961	2.109	6.729	8.282	9.296	10.012	10.369	10.753	11.736
50-100	%>0	0.559	0.757	0.772	0.774	0.819	0.879	0.882	0.875	0.886	0.886	0.885
	Area	8.501	9.597	10.124	10.161	24.612	31.889	37.662	38.779	39.865	42.391	47.091
km to lg, farm		89	77	77	73	60	52	51	54	51	51	52
Kebeles (%)		0.536	0.670	0.649	0.655	0.709	0.772	0.720	0.705	0.771	0.760	0.714
Sorghum												
< 25	%>0	0.075	0.067	0.072	0.158	0.264	0.319	0.328	0.330	0.341	0.359	0.366
	Area	2.322	2.065	1.895	1.665	1.204	1.591	2.388	1.981	2.008	2.176	2.936
25 50	%>0	0.162	0.178	0.196	0.258	0.294	0.322	0.355	0.369	0.403	0.424	0.413
	Area	2.795	2.741	1.716	1.718	5.132	6.384	9.807	6.175	6.326	6.681	8.117
50-100	%>0	0.412	0.444	0.454	0.525	0.572	0.627	0.703	0.697	0.772	0.775	0.769
	Area	7.644	8.197	8.141	7.022	25.550	28.348	39.008	26.066	26.804	28.612	34.261
km to lg, farm		107	105	107	104	101	97	92	89	71	70	70
Kebeles (%)		0.164	0.181	0.197	0.234	0.486	0.509	0.498	0.520	0.516	0.518	0.513
Teff												
< 25	%>0	0.078	0.099	0.128	0.160	0.276	0.337	0.328	0.394	0.408	0.412	0.405
	Area	0.507	0.395	0.263	0.283	0.416	0.589	0.566	0.702	0.746	0.786	0.768
25 50	%>0	0.234	0.317	0.297	0.340	0.398	0.458	0.481	0.524	0.547	0.565	0.568
	Area	1.092	0.958	0.963	0.995	2.193	2.478	2.826	3.214	3.336	3.431	3.391
50-100	%>0	0.390	0.475	0.547	0.612	0.739	0.794	0.816	0.809	0.845	0.857	0.861
	Area	9.019	6.307	5.046	4.602	5.265	7.761	10.274	10.165	10.521	11.319	11.634
km to lg, farm		112	113	107	98	96	78	75	76	75	68	68
Kebeles (%)		0.158	0.203	0.349	0.366	0.563	0.566	0.545	0.562	0.561	0.546	0.555
Wheat												
< 25	%>0	0.020	0.017	0.017	0.108	0.242	0.315	0.320	0.364	0.392	0.380	0.365
	Area	0.585	0.757	0.512	1.298	2.693	2.890	2.864	3.380	3.607	3.665	3.678
25 50	%>0	0.176	0.237	0.267	0.351	0.379	0.448	0.448	0.474	0.505	0.509	0.504
	Area	4.577	5.375	4.051	6.728	6.229	7.670	7.696	8.247	8.989	9.167	9.229
50-100	%>0	0.706	0.678	0.733	0.757	0.757	0.841	0.829	0.853	0.859	0.881	0.876
	Area	20.897	23.383	23.138	26.074	24.414	26.736	27.708	26.391	27.940	27.170	28.078
km to lg, farm		80	83	82	75	88	79	80	79	76	64	65
Kebeles (%)		0.105	0.119	0.122	0.144	0.373	0.390	0.405	0.408	0.389	0.409	0.399

Source: Own computation from 2003/4-2013/14 CSA smallholder farm surveys.

Note: Area is in 100 ha. Statistics are calculated using the sub-sample of kebeles that are included in the analysis for each of the crops. The criteria for inclusion in the sub-sample are that the kebele is within 150 km of a commercial farm growing the specified crop in 2014 and that more than 10% of households in the kebele grow the crop.

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Figure A1: Inter-temporal changes in proximity between large and small farms, 2004-2014

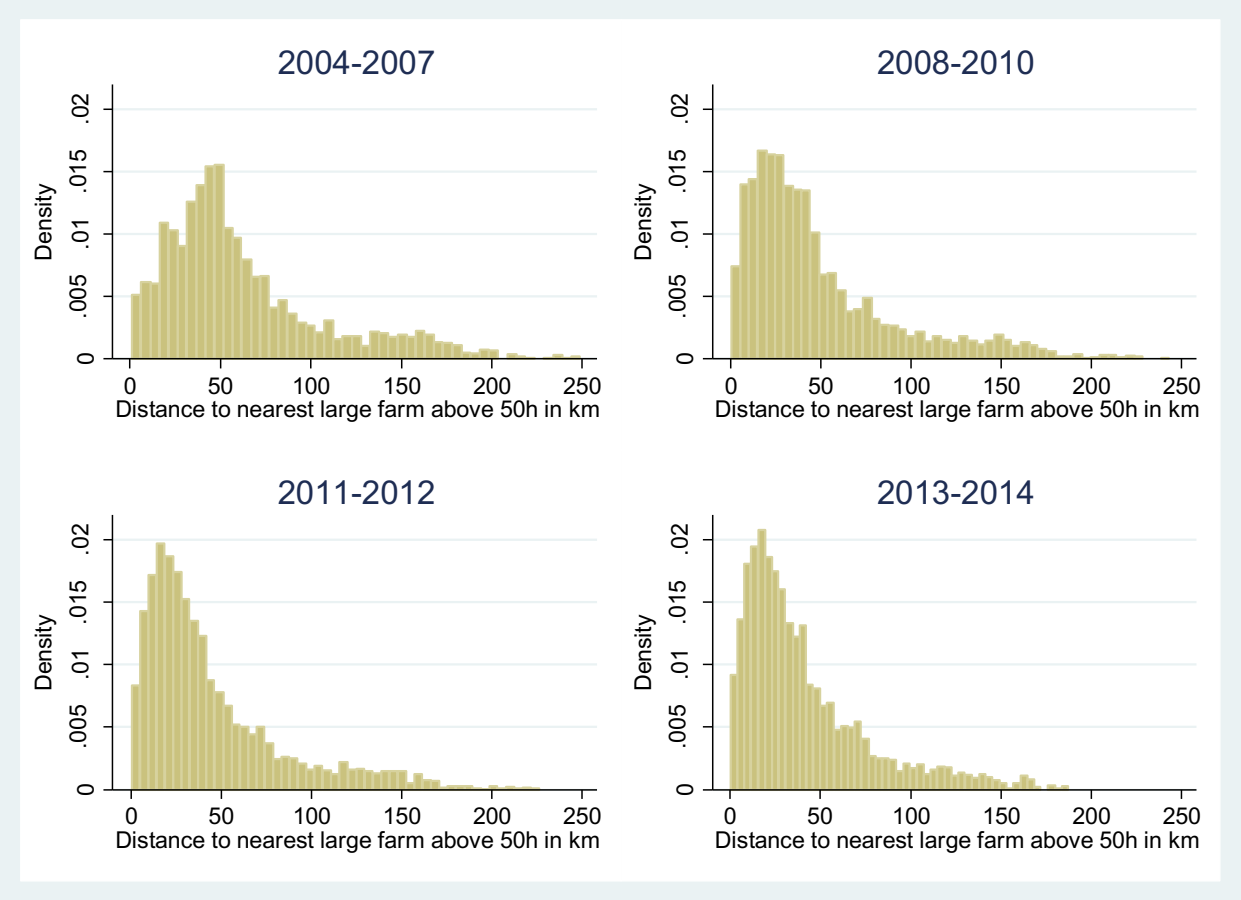

Figure A2: Distance from Kebele centroid to nearest commercial farm, by crop

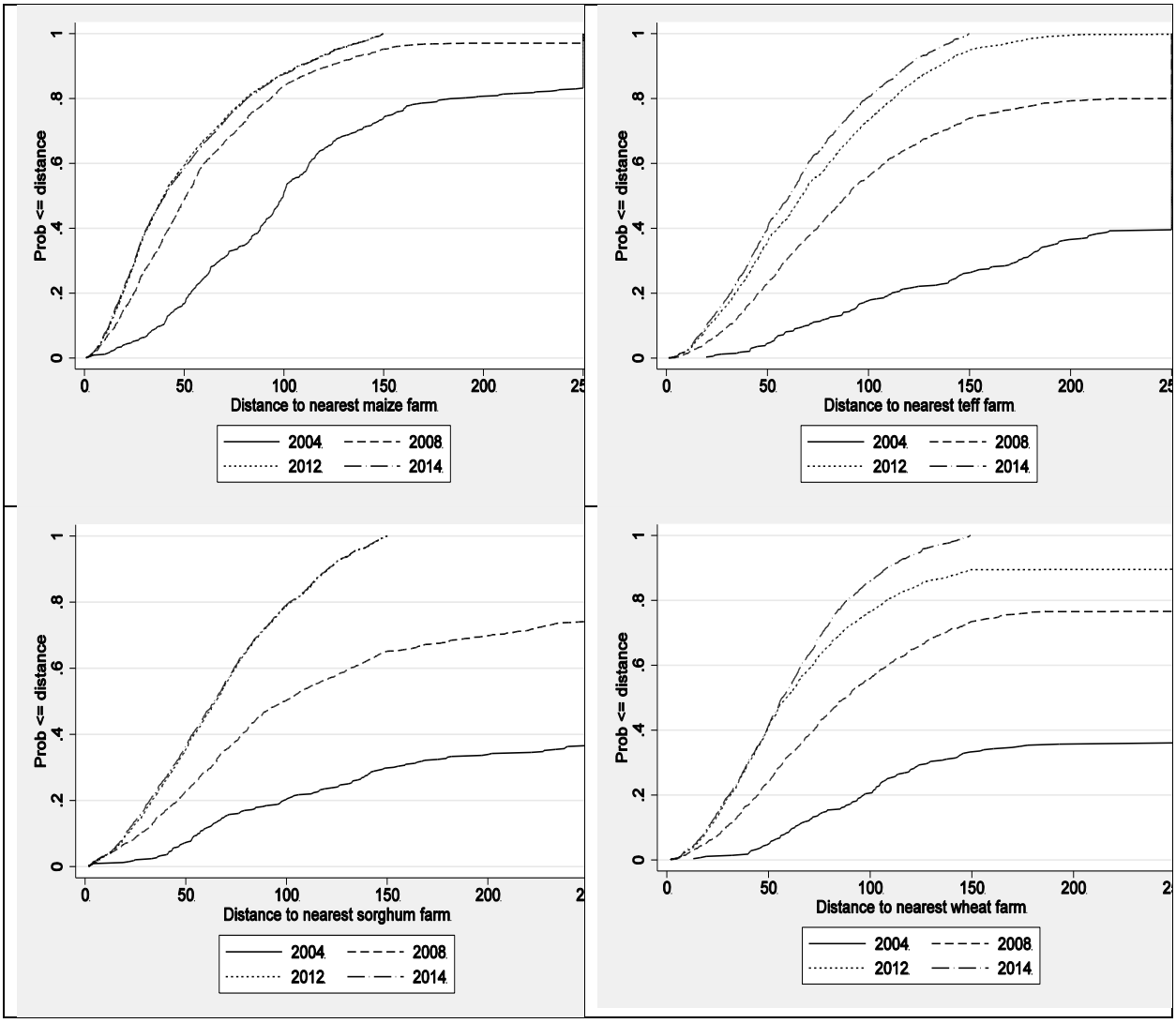

Figure A3: Location of commercial sorghum farms in 2003/4 relative to smallholder kebeles in 0-25, 25-50, 50-100, and 100-150 km distance bands

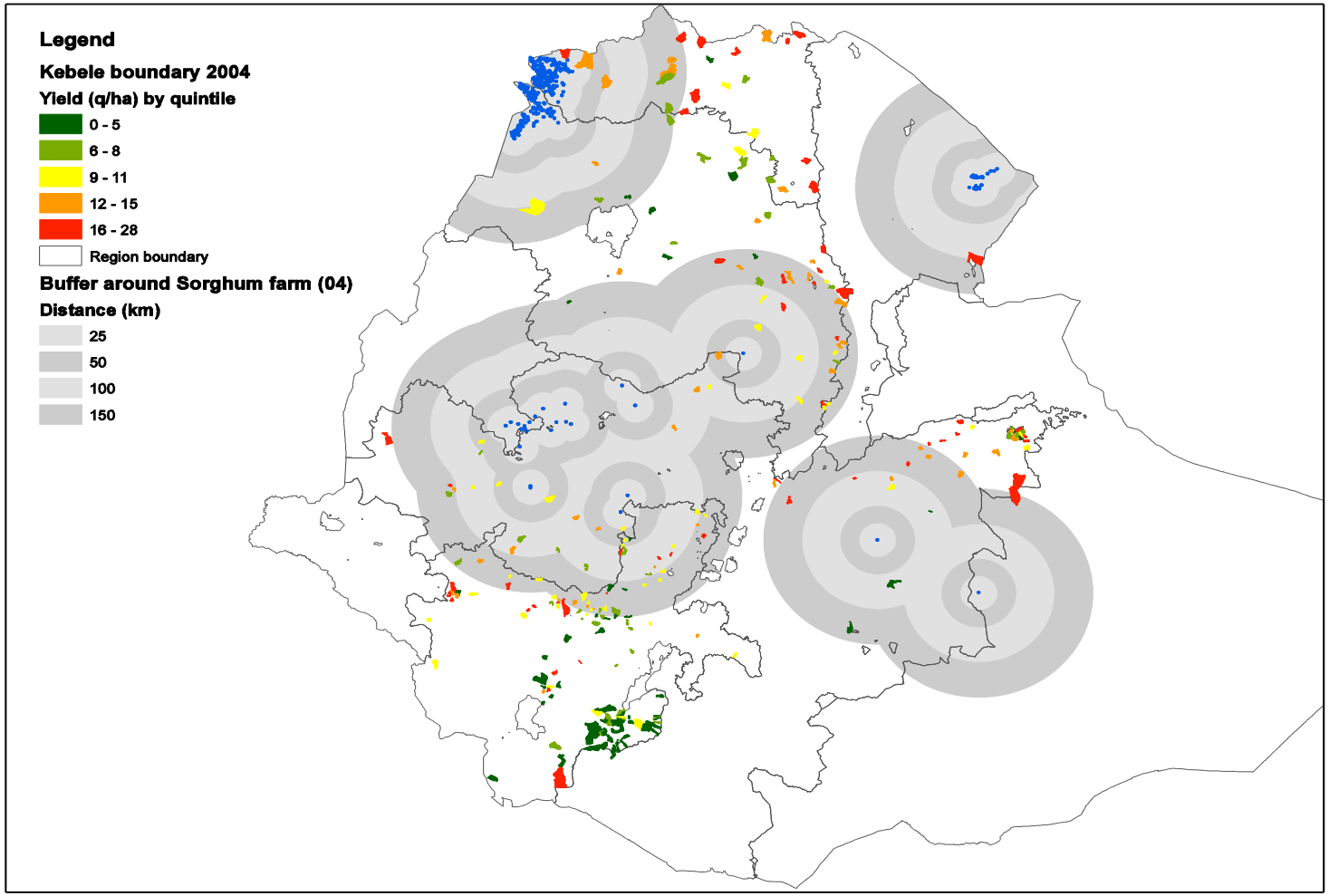

Figure A4: Location of commercial sorghum farms in 2013/14 relative to smallholder kebeles in 0-25, 25-50, 50-100, and 100-150 km distance bands

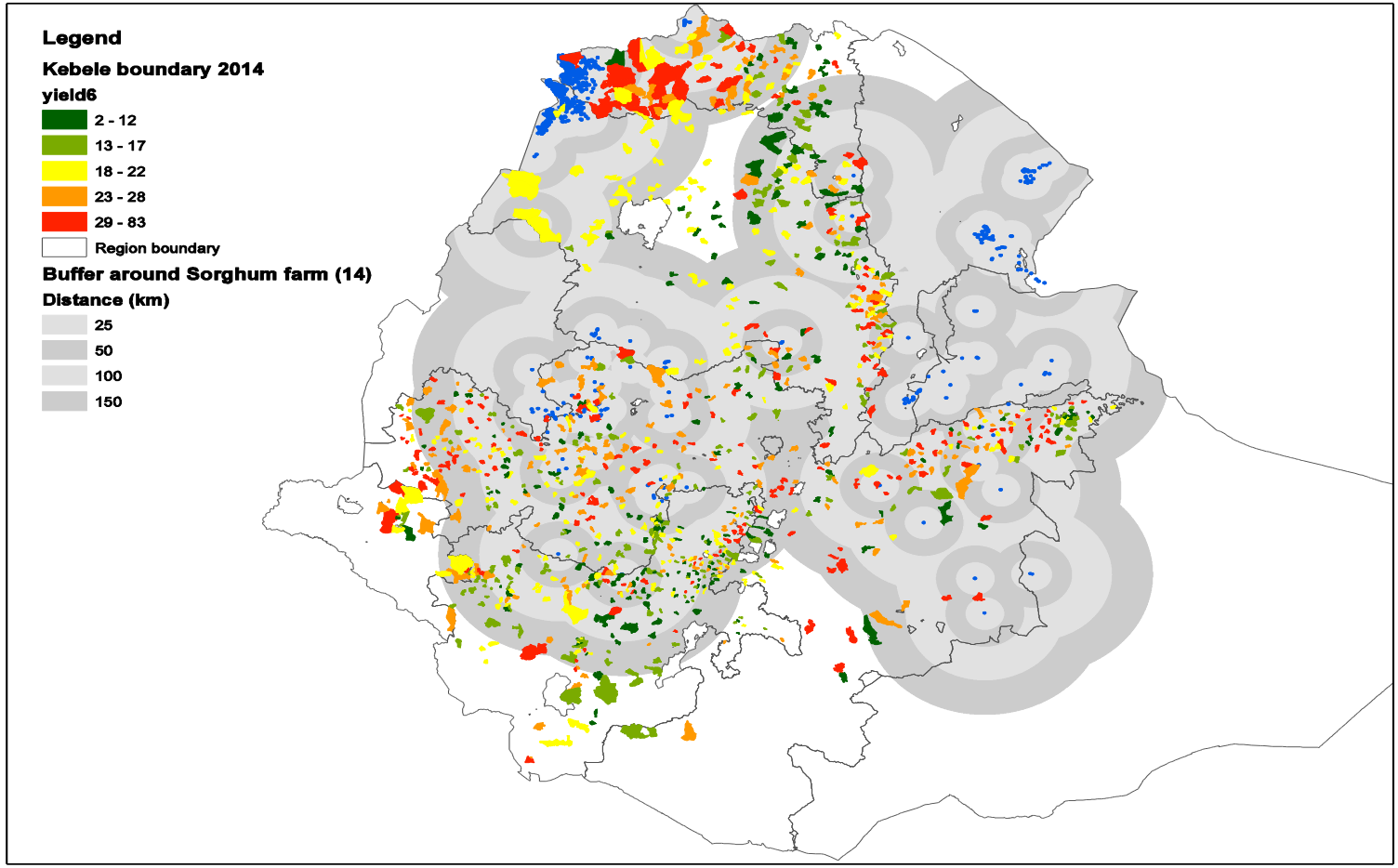

Figure A5: Location of commercial teff farms in 2003/4 relative to smallholder kebeles in 0-25, 25-50, 50-100, and 100-150 km distance bands

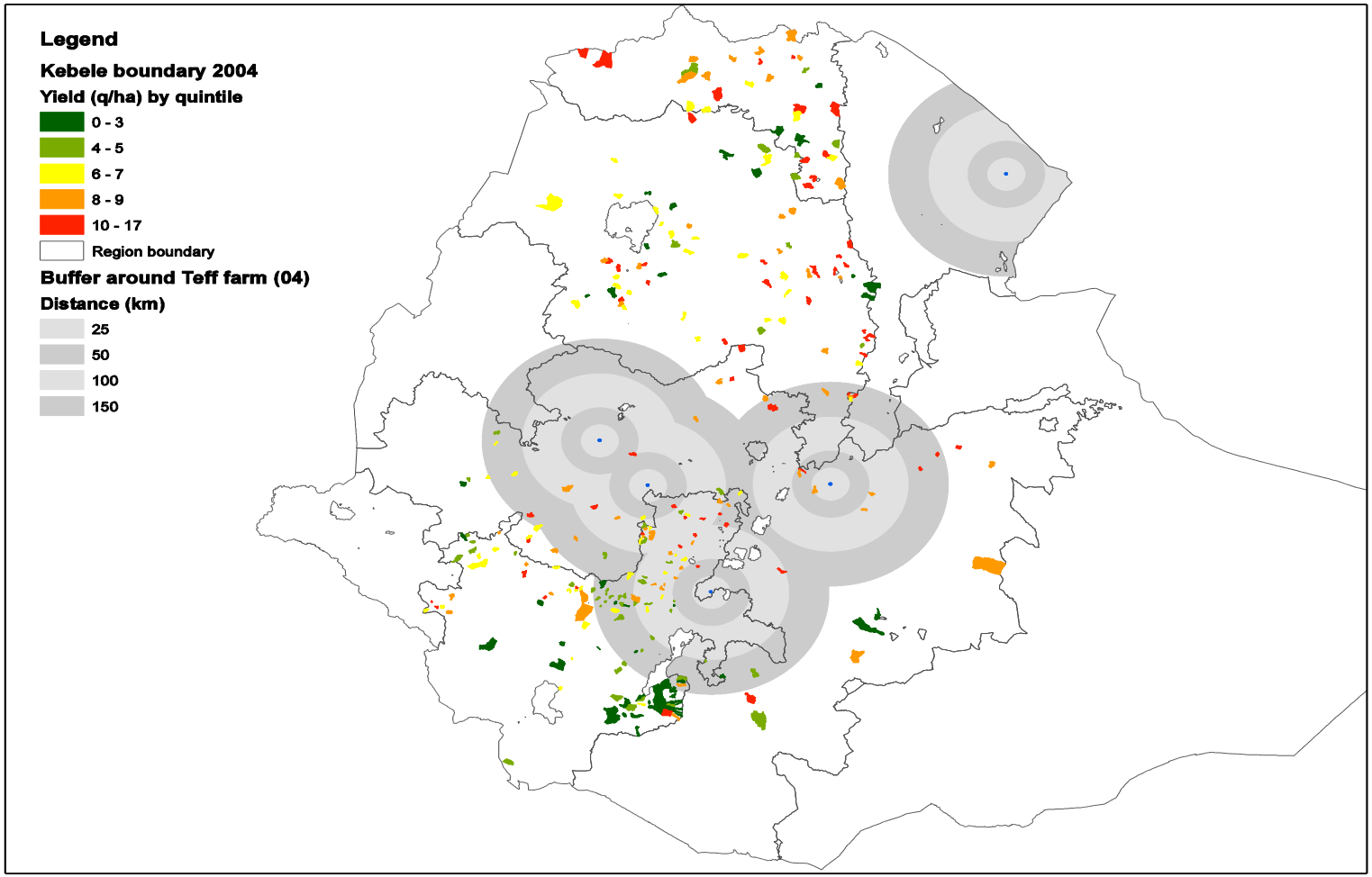

Figure A6: Location of commercial teff farms in 2013/14 relative to smallholder kebeles in 0-25, 25-50, 50-100, and 100-150 km distance bands

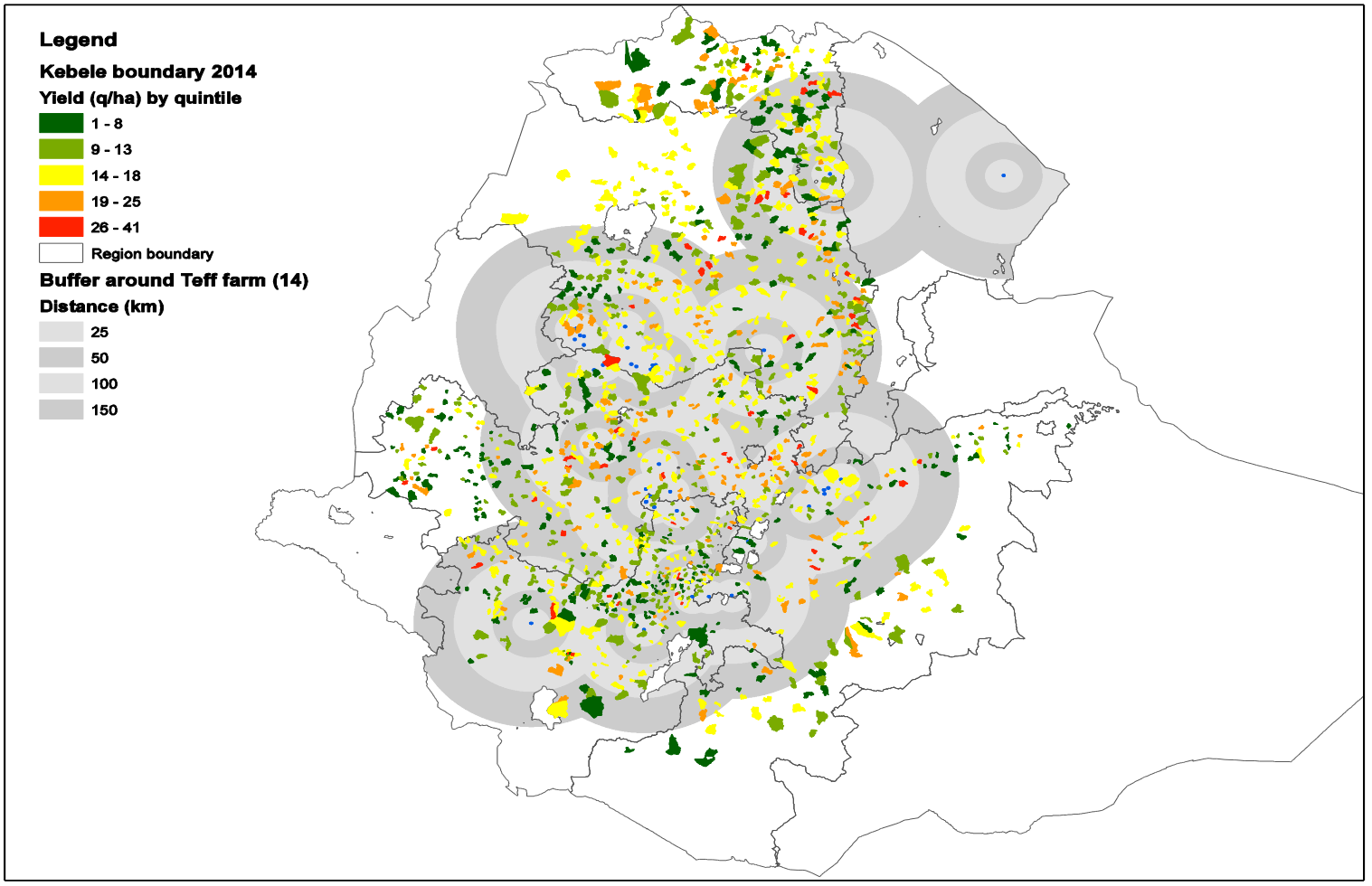

Figure A7: Location of commercial wheat farms in 2003/4 relative to smallholder kebeles in 0-25, 25-50, 50-100, and 100-150 km distance bands

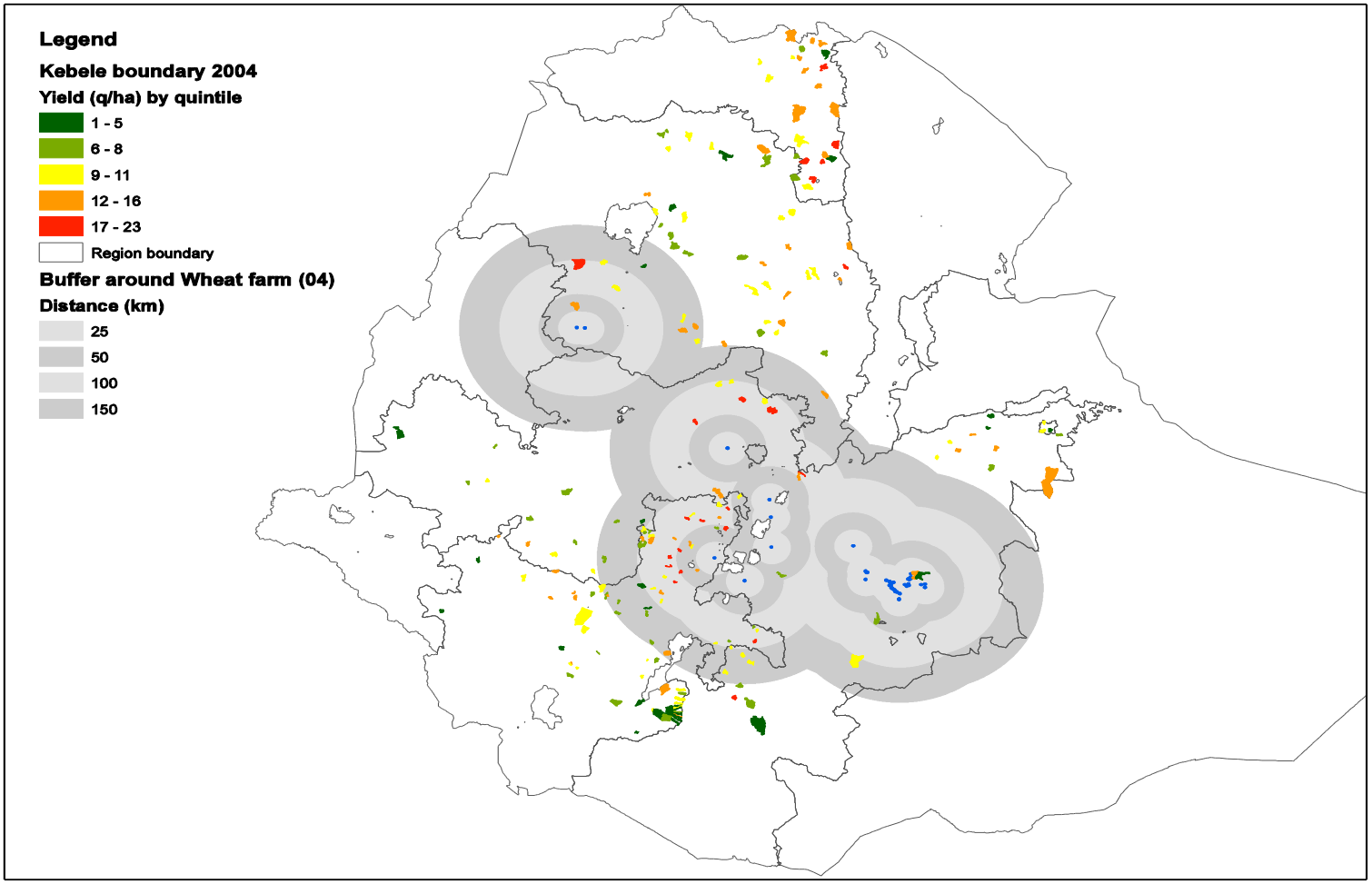

Figure A8: Location of commercial wheat farms in 2013/14 relative to smallholder kebeles in 0-25, 25-50, 50-100, and 100-150 km distance bands

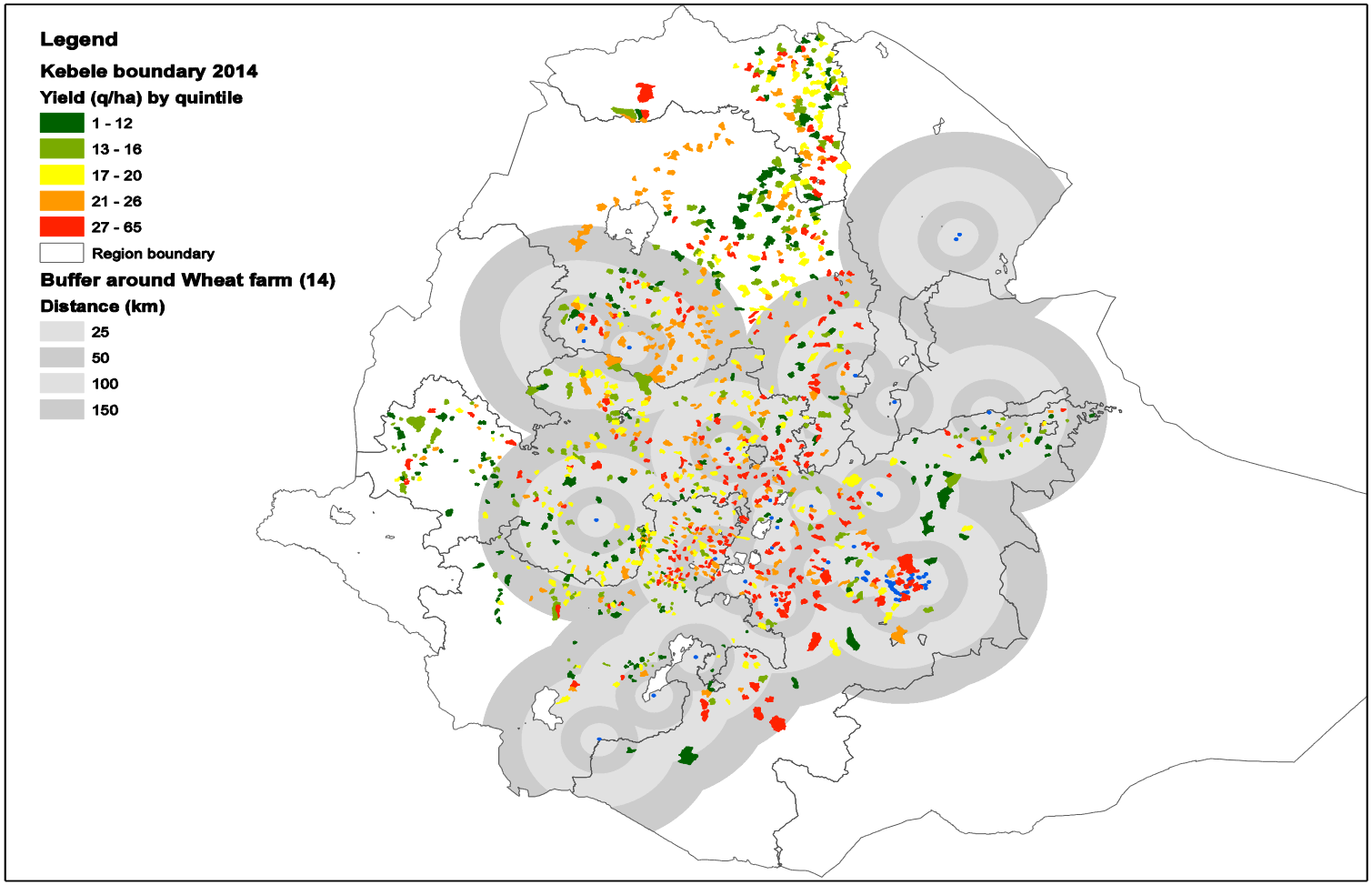

Figure A9: Location of commercial maize farms in 2003/4 relative to smallholder kebeles in 0-25, 25-50, 50-100, and 100-150 km distance bands

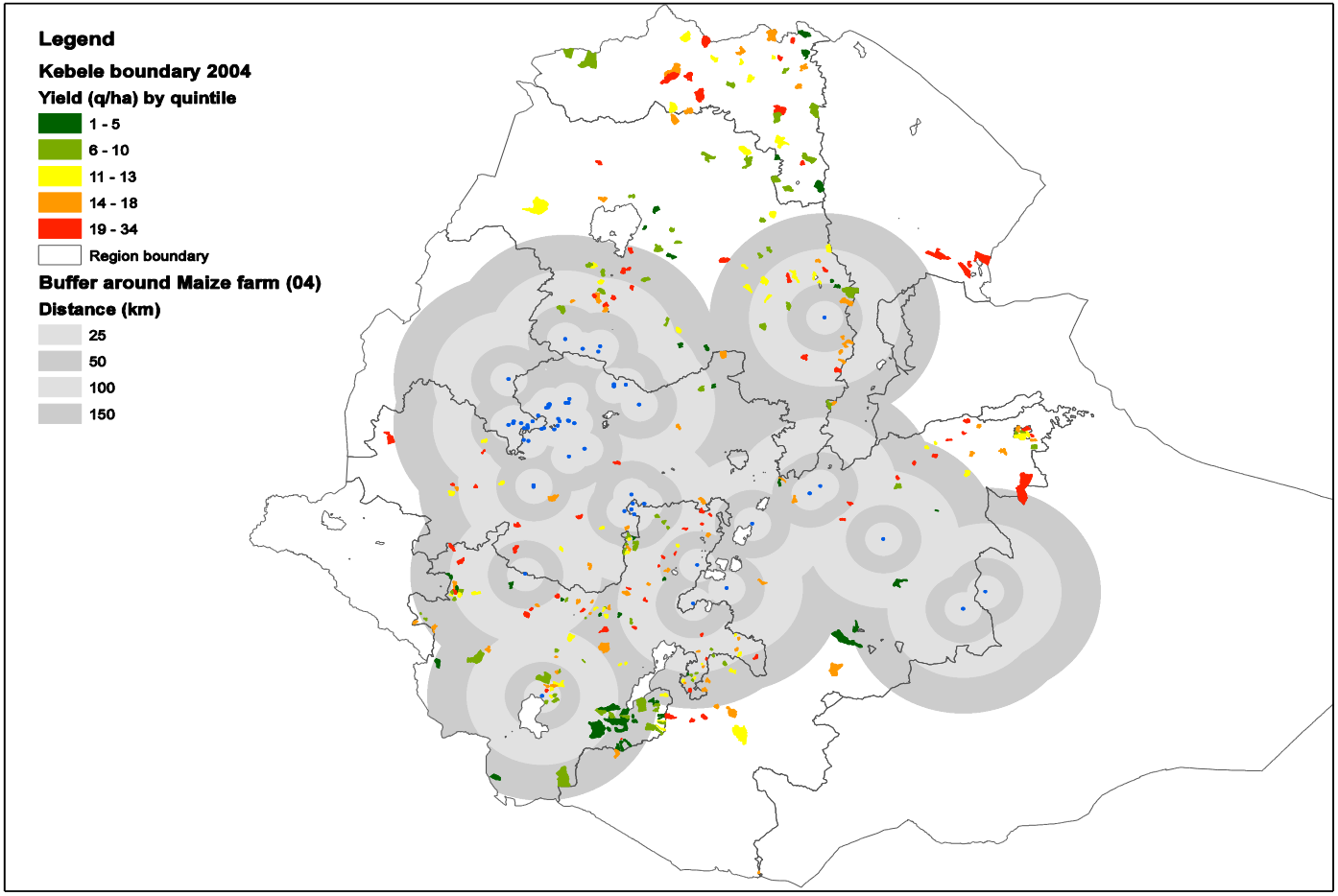
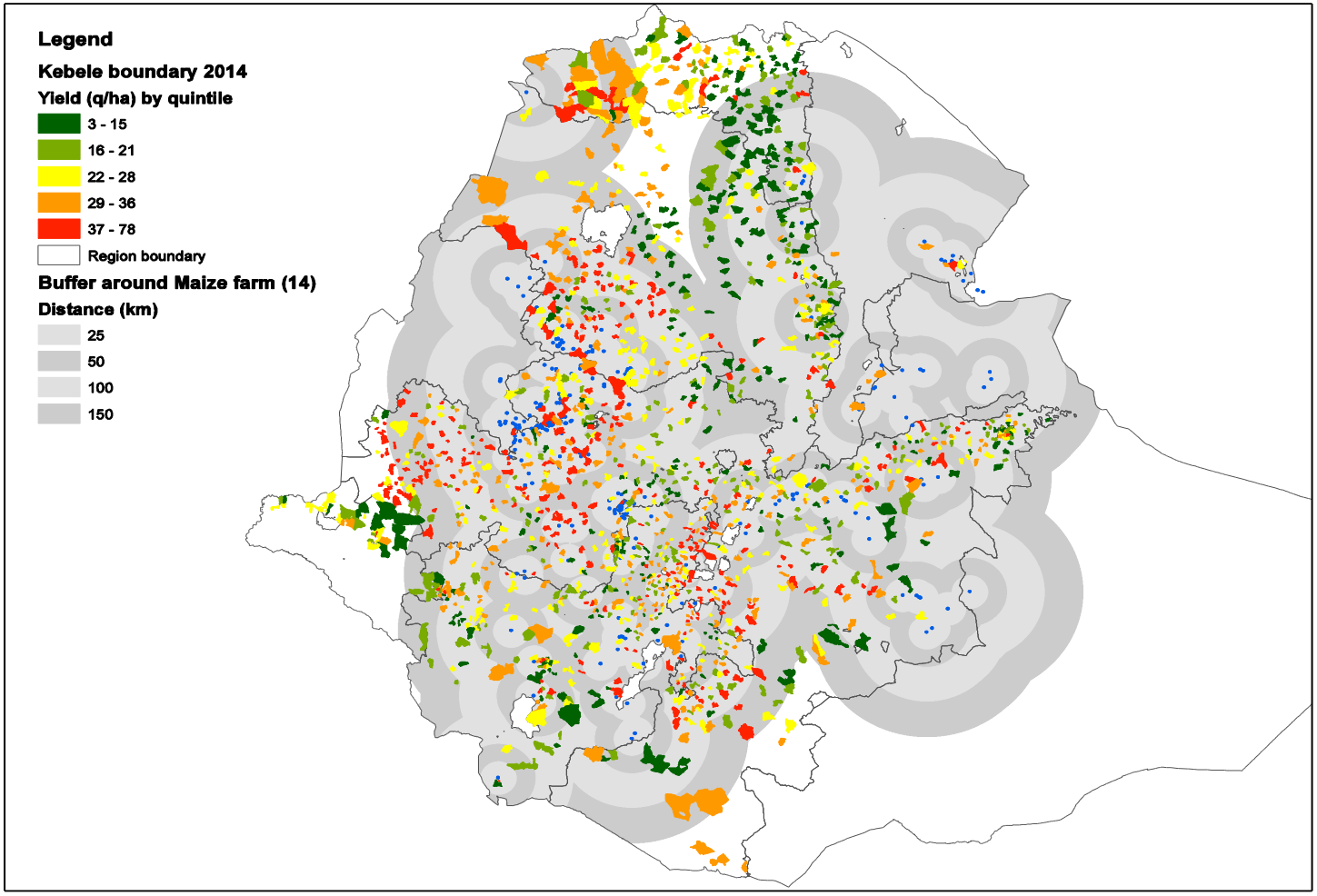
Figure A10: Location of commercial maize farms in 2013/14 relative to smallholder kebeles in 0-25, 25-50, 50-100, and 100-150 km distance bands