Micronized Copper Azole (Mca) Preservative:

Treatability and Performance

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TREATABILITY OF MCA ON VARIOUS WOOD SPECIES

This treatability study was conducted in the pilot plant of Koppers Performance Chemicals Inc. in Griffin, GA to demonstrate the feasibility of treating various wood species and commodities with MCA. All treatments were conducted following AWPA T1 Standards, and Timber Products Inspection witnessed the treating study for evaluating both penetration and retentions.

All the charges in these treating series were conducted at a multiple target retentions to prove the system can adequately treat and penetrate pine species and Hem-Fir. Solution concentration can easily be modified "up or down" to achieve other retention values, such as those required for " Decking Use Only", above ground use, and Ground Contact use, or in the future, potential Piling or Marine Use.

The treating cycles used for treating these species, and treating solution assays are given in Tables 1 -5. The preservative penetration results and assay retention of the preservative actives are given in Tables 6 – 7. All the materials met the AWPA penetration requirements, and all the materials met or exceed the proposed MCA target retentions, and the proposed minimum retention requirement for each component.

Overall, these treatment trials adequately demonstrates that penetration and retention targets could be successfully met with MCA on the treatment of softwood species from southern Pine, red pine, radiata pine, ponderosa pine, Caribbean pine, eastern white pine, Patula pine, Scots pine-Ger, and hem-fir species.

LONG TERM FIELD PERFORMANCE

MCA treated stakes of pacific silver fir and white spruce at various retentions were installed in Maple Ridge, BC and Kincardine, On. In addition, ACQ reference stakes were installed in the same sites as well. The inspection results after 8-years exposure are illustrated in Figure 1-4. MCA treated fence posts with diameter in 3 to 5 inches were also installed in Maple Ridge, BC and Kincardine, On. The 8-years inspection results are given in Figure 5.

The inspection results showed that MCA preservative provided excellent long-term efficacy against decay fungi and termite attack. Overall, the field test results indicated that MCA has performed similar or better than ACQ reference preservative.

CONCLUSIONS

- MCA preservative can be used to treat a variety of wood species and achieve satisfactory penetration and retention requirements
- MCA treated Canadian wood species demonstrates good long-term field performance in

Canadian test sites

Table 1. Treating Cycles and Treating Solution Strength for Southern Pine

Charge No.	Target Retention (pcf)	Duration in Minutes			Treating Solution			
		Initial Vacuum (-16"Hg)	High Pressure (150 psi)	Final Vacuum (-26"Hg)	Copper (as %Cu)	Azole (as %Teb.)	Total Actives (%)	% Cu/Teb. Balance
3323-1	0.08	4	6	45	0.322	0.0147	0.337	95.6/4.4
3323-2	0.08	4	10	45	0.294	0.0141	0.308	95.4/4.6
3323-3	0.08	4	5	45	0.363	0.0146	0.378	96.1/3.9
3323-4	0.08	4	8	45	0.366	0.0139	0.380	96.3/3.7
3323-5	0.08	4	5	45	0.351	0.0132	0.364	96.4/3.6
3323-6	0.21	4	6	45	0.934	0.0382	0.972	96.1/3.9
3323-7	0.21	4	7	45	0.892	0.0349	0.927	96.2/3.8
3323-8	0.21	4	9	45	0.678	0.0297	0.708	95.8/4.2
3323-9	0.21	4	6	45	0.943	0.0356	0.979	96.4/3.6
3323-10	0.21	4	11	45	0.936	0.0342	0.970	96.5/3.5
3323-11	0.31	5	5	45	1.443	0.0513	1.494	96.6/3.4
3323-12	0.31	4	10	45	1.404	0.0544	1.458	96.3/3.7
3323-13	0.31	4	7	45	1.441	0.0544	1.495	96.4/3.6
3323-14	0.31	4	8	45	1.405	0.0522	1.457	96.4/3.6
3323-15	0.31	5	3	45	1.350	0.0488	1.399	96.5/3.5

Table 2. Treating Cycles and Treating Solution Strength for Red Pine

Charge No.	Target Retention (pcf)	Duration in Minutes			Treating Solution			
		Initial Vacuum (-26"Hg)	High Pressure (170 psi)	Final Vacuum (-26"Hg)	Copper (as %Cu)	Azole (as %Teb.)	Total Actives (%)	% Cu/Teb. Balance
3323-21	0.08	15	59	45	0.380	0.0137	0.394	96.5/3.5
3323-22	0.08	15	81	30	0.385	0.0127	0.398	96.8/3.2
3323-23	0.08	15	90	30	0.371	0.0134	0.384	96.5/3.5
3323-24	0.08	15	90	45	0.373	0.0132	0.386	96.6/3.4
3323-25	0.08	15	80	45	0.369	0.0111	0.380	97.1/2.9
3323-26	0.21	15	90	45	0.919	0.0336	0.953	96.5/3.5
3323-27	0.21	15	90	30	0.890	0.0311	0.921	96.6/3.4
3323-28	0.21	15	90	45	0.931	0.0322	0.963	96.7/3.3
3323-29	0.21	15	55	60	0.928	0.0334	0.961	96.5/3.5
3323-30	0.21	15	90	60	0.900	0.0320	0.932	96.6/3.4
3323-31	0.31	15	30	30	1.453	0.0539	1.507	96.4/3.6
3323-32	0.31	15	90	30	1.347	0.0467	1.394	96.7/3.3
3323-33	0.31	15	90	60	1.373	0.0468	1.420	96.7/3.3
3323-34	0.31	15	90	60	1.421	0.0498	1.471	96.6/3.4
3323-35	0.31	15	90	30	1.433	0.0478	1.481	96.8/3.2

Table 3. Treating Cycles and Treating Solution Strength for Ponderosa Pine

Charge No.	Target Retention (pcf)	Duration in Minutes			Treating Solution			
		Initial Vacuum (-18"Hg)	High Pressure (170 psi)	Final Vacuum (-26"Hg)	Copper (as %Cu)	Azole (as %Teb.)	Total Actives (%)	% Cu/Teb. Balance
3323-36A	0.08	4	30	30	0.510	0.0193	0.529	96.4/3.6
3323-37	0.08	4	60	45	0.367	0.0140	0.381	96.3/3.7
3323-38	0.08	4	30	45	0.359	0.0148	0.374	96.0/4.0
3323-39	0.08	4	33	45	0.362	0.0144	0.376	96.2/3.8
3323-40	0.08	4	30	45	0.369	0.0138	0.383	96.4/3.6
3323-41A	0.21	4	46	30	1.206	0.0456	1.252	96.4/3.6
3323-42A	0.21	4	90	30	1.231	0.0451	1.276	96.5/3.5
3323-43A	0.21	4	47	18	1.236	0.0445	1.281	96.5/3.5
3323-44A	0.21	4	47	30	1.224	0.0454	1.269	96.4/3.6
3323-45A	0.21	4	90	30	1.220	0.0449	1.265	96.5/3.5

Table 4. Treating Cycles and Treating Solution Strength for Scots Pine-German

Charge No.	Target Retention (pcf)	**Duration in Minutes**			Treating Solution			
		Initial Vacuum (-26"Hg)	**High Pressure (170 psi)**	**Final Vacuum (-26"Hg)**	Copper (as %Cu)	Azole (as %Teb.)	Total Actives (%)	% Cu/Teb. Balance
3323-16	0.08	**15**	**30**	**60**	0.356	0.0135	0.370	96.3/3.7
3323-17	0.08	**4**	**70**	**30**	0.364	0.0150	0.379	96.1/3.9
3323-18	0.08	**4**	**30**	**60**	0.363	0.0143	0.377	96.2/3.8
3323-19	0.08	**15**	**62**	**60**	0.36	0.0142	0.374	96.2/3.8
3323-20	0.08	**15**	**62**	**60**	0.353	0.0135	0.367	96.3/2.7

Table 5. Treating Cycles and Treating Solution Strength for Hem Fir

Charge No.	Target Retention (pcf)	Duration in Minutes			Treating Solution			
		Initial Vacuum (-26"Hg)	High Pressure (170 psi)	Final Vacuum (-26"Hg)	Copper (as %Cu)	Azole (as %Teb.)	Total Actives (%)	% Cu/Teb. Balance
3323-46	0.08	30	180	30	0.441	0.0138	0.455	97.0/3.0
3323-47	0.08	30	180	30	0.468	0.0142	0.482	97.1/2.9
3323-48	0.08	30	180	30	0.405	0.0135	0.419	96.8/3.2
3323-49	0.08	30	180	30	0.403	0.0152	0.418	96.4/3.6
3323-50	0.08	30	180	30	0.405	0.0154	0.420	96.3/3.7
3323-51	0.21	30	180	30	1.017	0.0416	1.059	96.1/3.9
3323-52	0.21	30	180	30	1.001	0.0405	1.042	96.1/3.9
3323-53	0.21	30	180	30	0.961	0.0403	1.001	96.0/4.0
3323-54	0.21	30	180	30	0.958	0.0384	0.996	96.2/3.8
3323-55	0.21	30	180	30	0.978	0.0387	1.017	96.2/3.8

Table 6. Southern Pine and Red Pine Treating Results – Gauge and Assay Retention and Penetration

Charge No.	Gauge Retention (pcf)	Assay Retention (0.0 - 0.60 inch)			Penetration	
		Copper (pcf) (as Cu)	Azole (pcf) (as Teb.)	Total Actives (pcf)	Number of Cores Passing	% Cores Passing
Southern Pine						
3323-1	0.09	0.105	0.0045	0.11	19/20	95
3323-2	0.13	0.125	0.0050	0.13	18/20	90
3323-3	0.09	0.107	0.0036	0.11	20/20	100
3323-4	0.09	0.105	0.0039	0.11	19/20	95
3323-5	0.09	0.108	0.0038	0.11	17/20	85
3323-6	0.24	0.276	0.0091	0.29	17/20	85
3323-7	0.24	0.263	0.0100	0.27	20/20	100
3323-8	0.25	0.202	0.0075	0.21	19/20	95
3323-9	0.23	0.256	0.0099	0.27	19/20	95
3323-10	0.24	0.263	0.0094	0.27	20/20	100
3323-11	0.38	0.424	0.0162	0.44	20/20	100
3323-12	0.37	0.363	0.0157	0.38	19/20	95
3323-13	0.38	0.443	0.0160	0.46	20/20	100
3323-14	0.37	0.416	0.0127	0.43	19/20	90
3323-15	0.40	0.360	0.0132	0.37	19/20	90
Red Pine						
3323-21	0.11	0.116	0.0040	0.12	20/20	100

Charge No.	Gauge Retention (pcf)	Assay Retention (0.0 - 0.60 inch)			Penetration	
		Copper (pcf) (as Cu)	Azole (pcf) (as Teb.)	Total Actives (pcf)	Number of Cores Passing	% Cores Passing
3323-22	0.10	0.145	0.0053	0.15	20/20	100
3323-23	0.07	0.123	0.0056	0.13	20/20	100
3323-24	0.10	0.121	0.0038	0.13	19/20	95
3323-25	0.09	0.121	0.0044	0.13	20/20	100
3323-26	0.22	0.319	0.0115	0.33	20/20	100
3323-27	0.20	0.302	0.0120	0.31	20/20	100
3323-28	0.23	0.327	0.0114	0.34	20/20	100
3323-29	0.27	0.291	0.0108	0.30	18/20	90
3323-30	0.24	0.314	0.0113	0.33	19/20	95
3323-31	0.30	0.410	0.0142	0.42	19/20	95
3323-32	0.29	0.396	0.0134	0.41	20/20	100
3323-33	0.32	0.314	0.0149	0.33	19/20	95
3323-34	0.38	0.299	0.0139	0.31	19/20	95
3323-35	0.29	0.302	0.0144	0.32	19/20	95

Table 7. Ponderosa Pine, Scots Pine-German and Hem Fir Treating Results – Gauge and Assay Retention and Penetration

Charge No.	Gauge Retention (pcf)	Assay Retention (0.0 - 0.60 inch)			Penetration	
		Copper (pcf) (as Cu)	Azole (pcf) (as Teb.)	Total Actives (pcf)	Number of Cores Passing	% Cores Passing
Ponderosa Pine						
3323-36A	0.12	0.110	0.0052	0.12	20/20	100
3323-37	0.11	0.091	0.0038	0.09	20/20	100
3323-38	0.09	0.089	0.0037	0.09	17/20	85
3323-39	0.08	0.082	0.0036	0.09	19/20	95
3323-40	0.09	0.081	0.0029	0.08	19/20	95
3323-41A	0.29	0.237	0.0127	0.25	20/20	100
3323-42A	0.28	0.206	0.0110	0.22	19/20	95
3323-43A	0.27	0.191	0.0101	0.20	19/20	95
3323-44A	0.28	0.206	0.0134	0.22	20/20	100
3323-45A	0.28	0.228	0.0120	0.24	20/20	100
German Scotts Pine						
3323-16	0.12	0.135	0.0065	0.14	18/20	90
3323-17	0.10	0.138	0.0064	0.14	16/20	80
3323-18	0.09	0.134	0.0056	0.14	18/20	90
3323-19	0.10	0.127	0.0059	0.13	16/20	80
3323-20	0.11	0.138	0.0051	0.14	16/20	80
Hem Fir						

Charge No.	Gauge Retention (pcf)	Assay Retention (0.0 - 0.60 inch)			Penetration	
		Copper (pcf) (as Cu)	Azole (pcf) (as Teb.)	Total Actives (pcf)	Number of Cores Passing	% Cores Passing
3323-46	0.14	0.195	0.0069	0.20	17/20	85
3323-47	0.15	0.152	0.0053	0.16	16/20	80
3323-48	0.16	0.150	0.0057	0.16	18/20	90
3323-49	0.14	0.137	0.0065	0.14	15/20	75
3323-50	0.15	0.175	0.0076	0.18	16/20	80
3323-51	0.29	0.281	0.0156	0.30	16/20	80
3323-52	0.31	0.316	0.0175	0.33	17/20	85
3323-53	0.31	0.189	0.0114	0.20	17/20	85
3323-54	0.32	0.228	0.0118	0.24	18/20	90
3323-55	0.22	0.298	0.0185	0.32	16/20	80

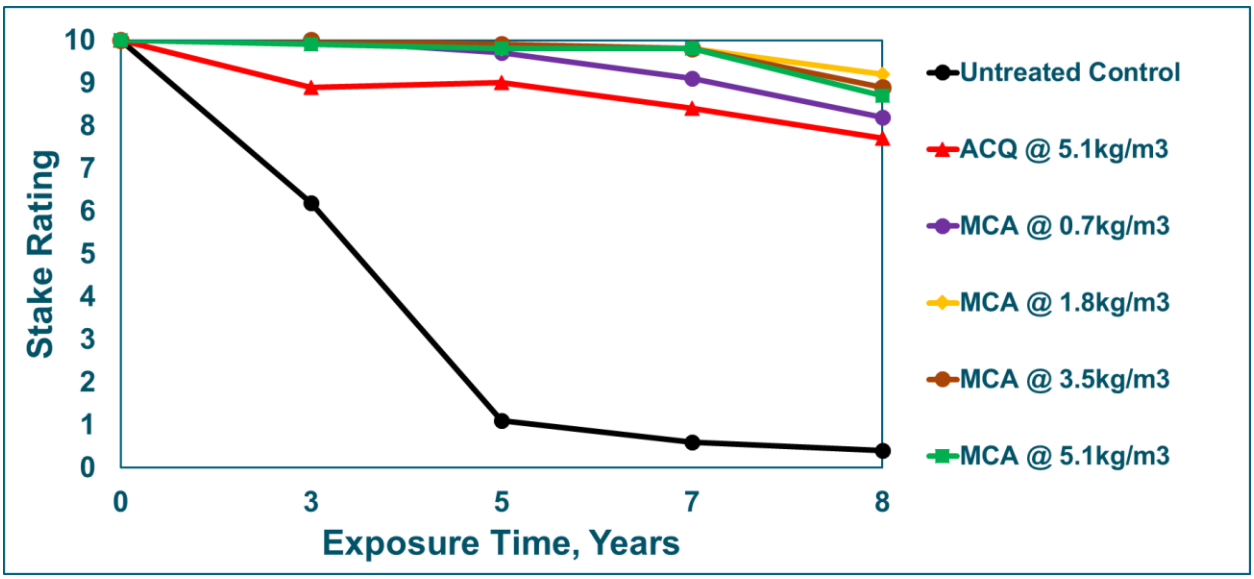

Figure 1. MCA Treated Pacific Silver Fir Installed in Maple Ridge

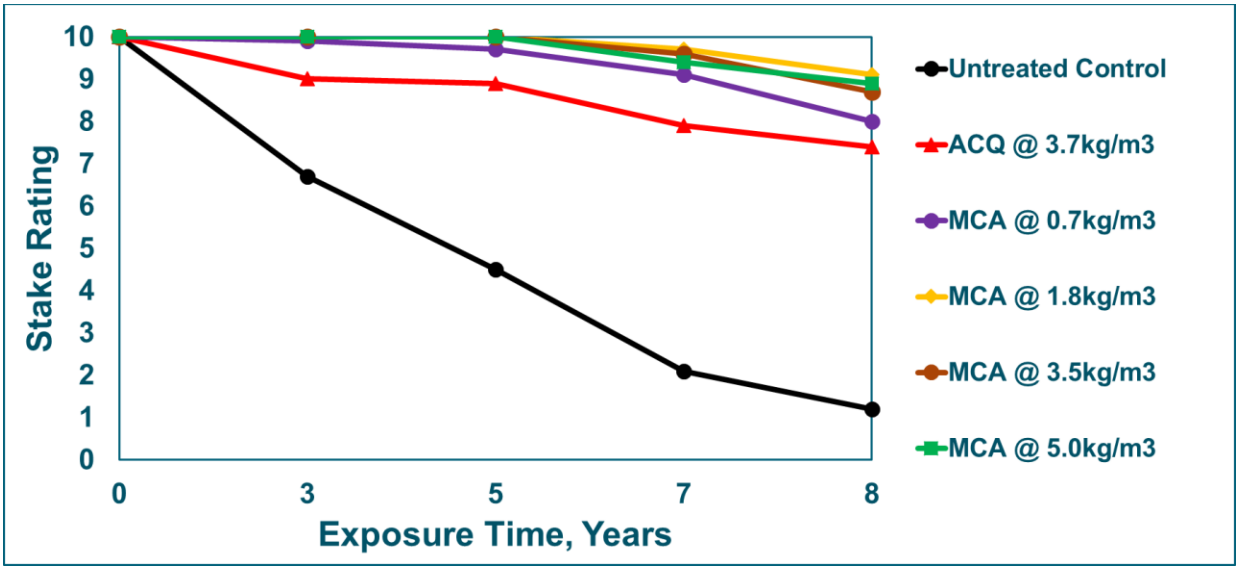

Figure 2. MCA Treated White Spruce Installed in Maple Ridge

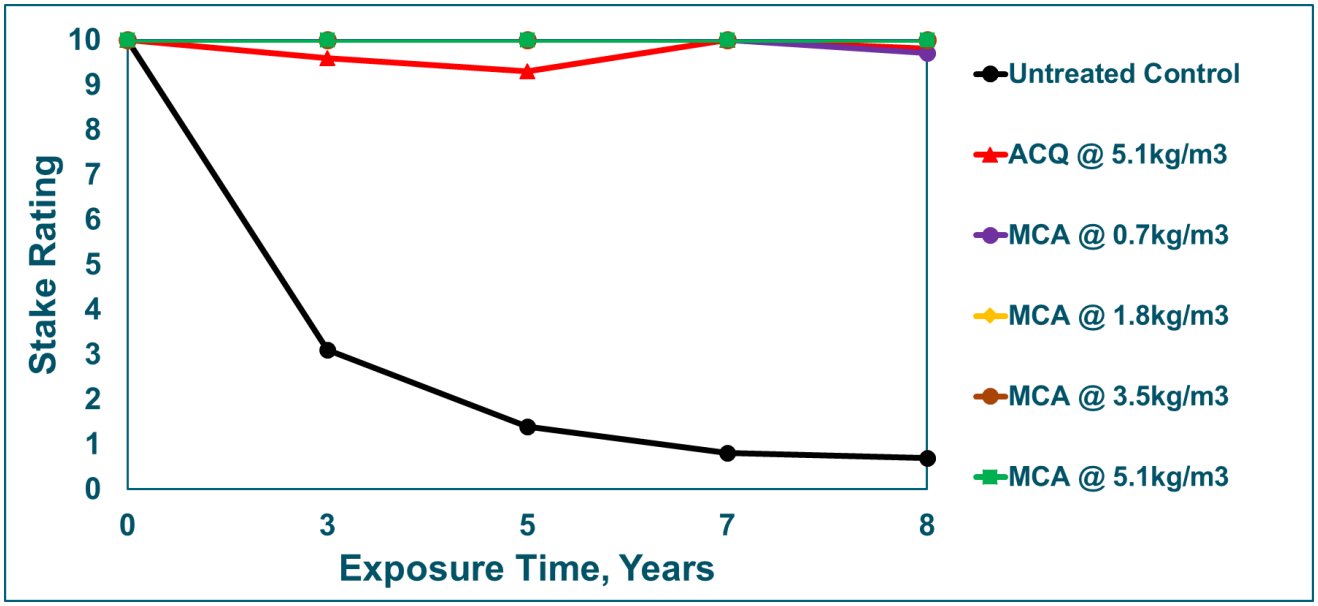

Figure 3. MCA Treated Pacific Silver Fir Installed in Kincardine

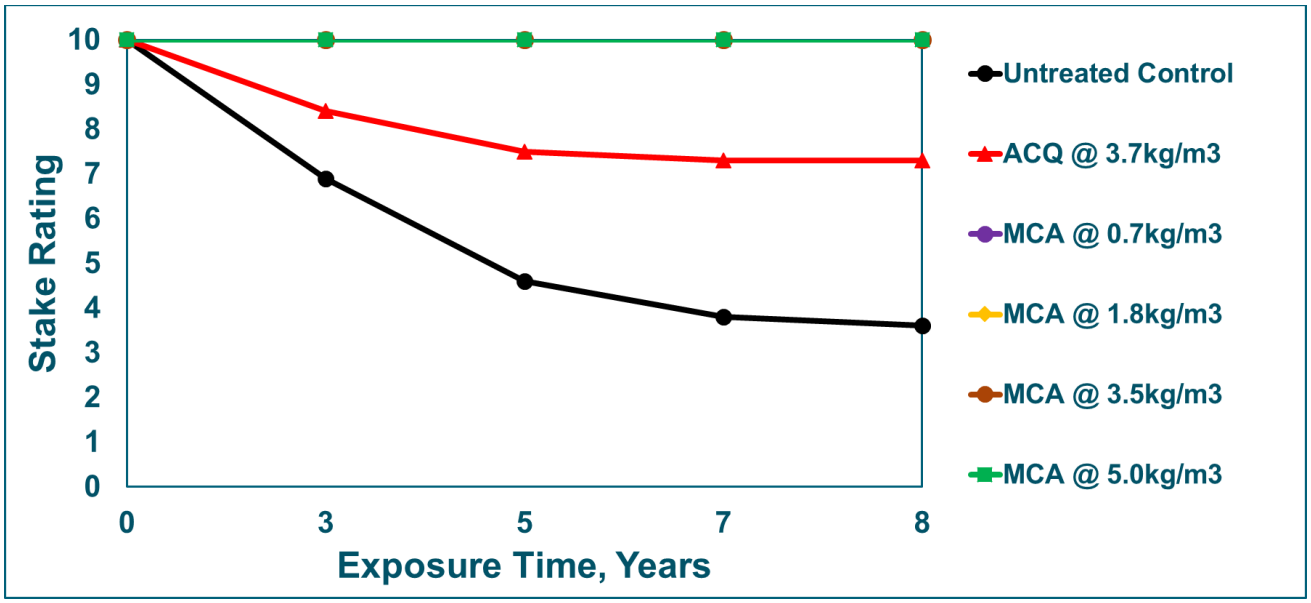

Figure 4. MCA Treated White Spruce Installed in Kincardine

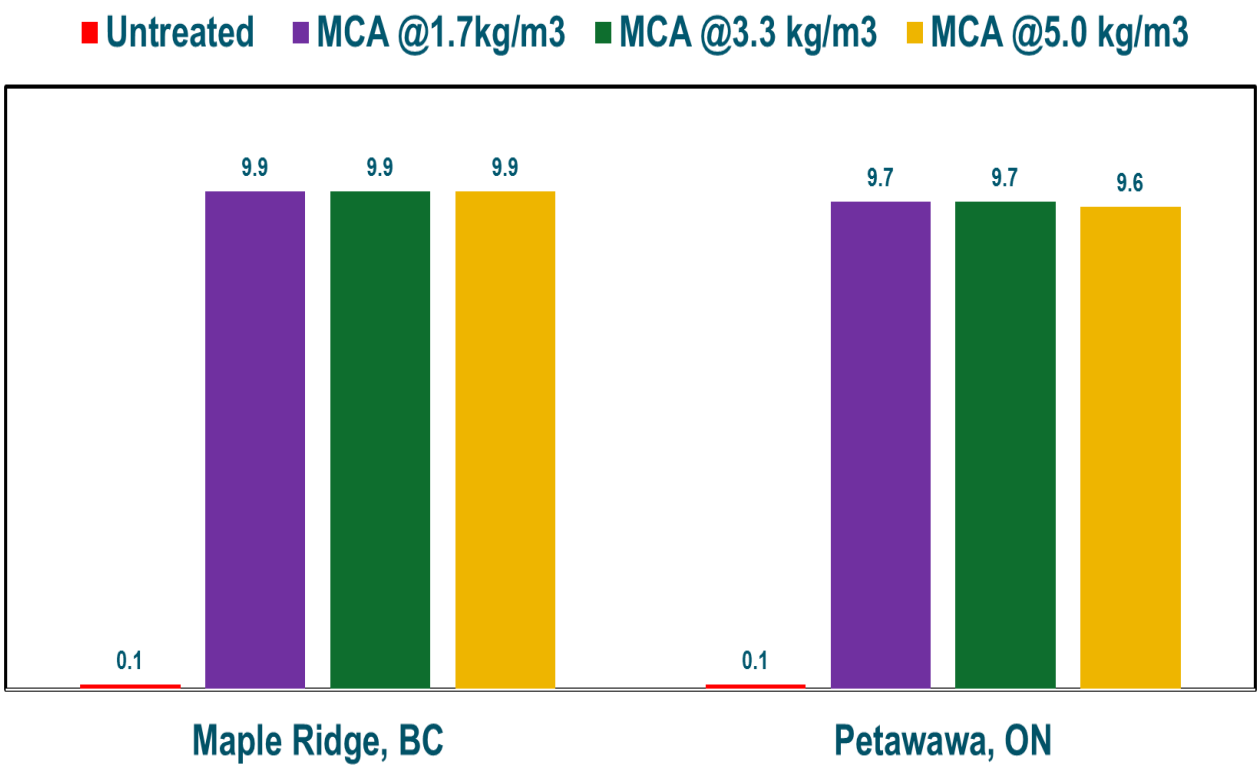

Figure 5. MCA Treated Posts after 8-years Field Exposure