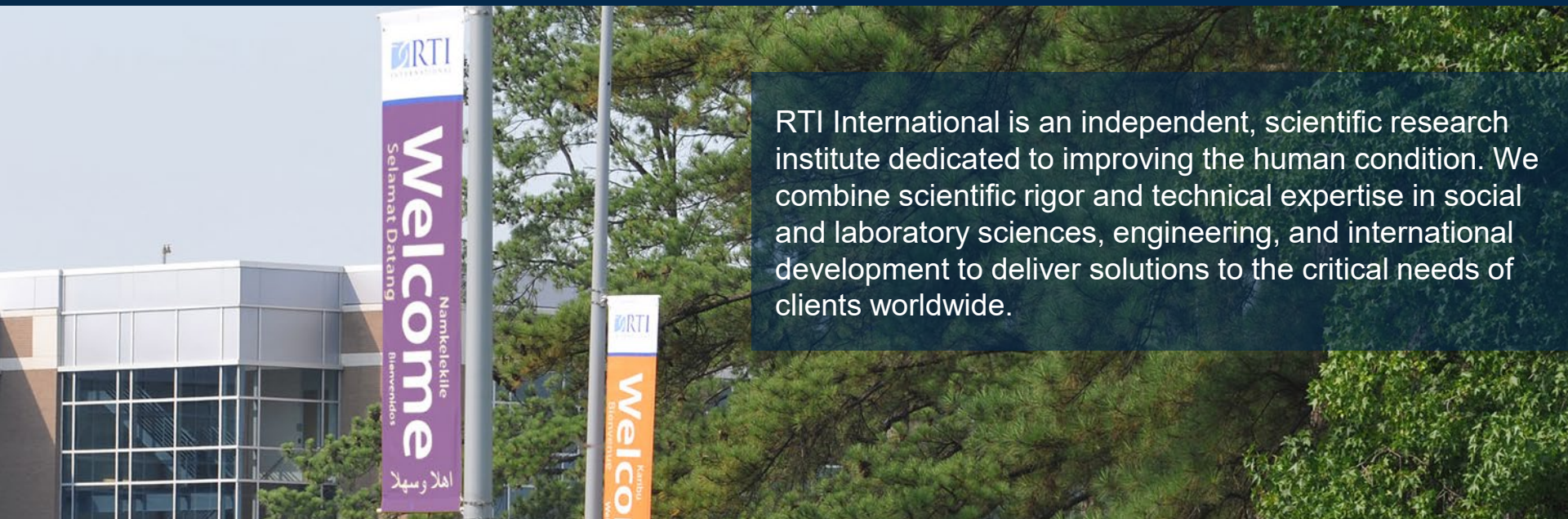


Impact of Feedstock Preprocessing on Biocrude Yield

tcbi  mass+2026

Melinda Barron
Chemical Engineer
August 26, 2026



RTI International is an independent, scientific research institute dedicated to improving the human condition. We combine scientific rigor and technical expertise in social and laboratory sciences, engineering, and international development to deliver solutions to the critical needs of clients worldwide.

Overview

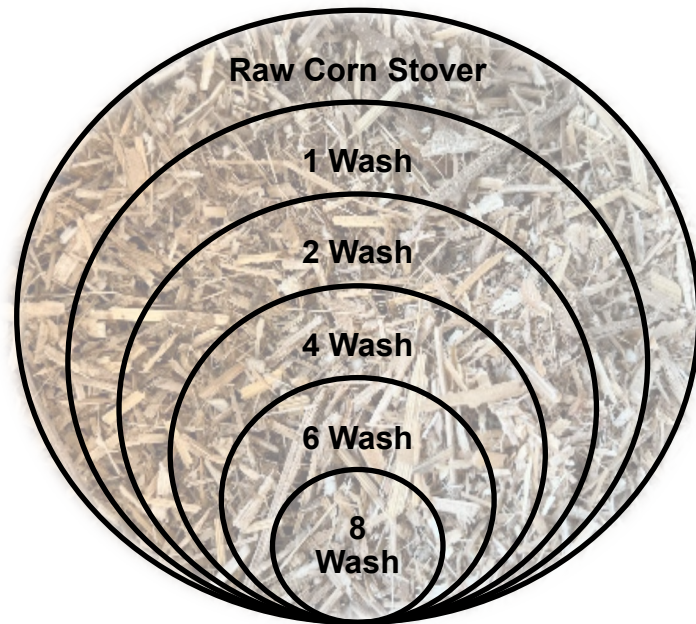
Demonstrate a technically feasible, economically viable pathway to produce low GHG emission SAF from preprocessed corn stover pyrolysis to support decarbonization of commercial aviation.

Objectives completed:

Demonstrate a novel corn stover pretreatment process to reduce ash and alkali and alkaline earth metals (AAEMs) and improve biocrude yields.

- One batch of raw corn stover was washed consecutively to generate 1, 2, 4, 6, and 8 wash cycle feedstock samples for CFP testing at RTI.

Partners: POET Research, Inc. and the National High Magnetic Field Laboratory at Florida State University



Feedstock Compositions

	C wt%	H wt%	N wt%	O wt% by difference	S (ppm)	Moisture wt%	Ash wt%	% Ash Reduction
Raw Corn Stover	43.2	6.2	0.6	50.0	461.13	6.34	7.85	
1-Wash Corn Stover	44.2	6.0	0.4	49.3	439.45	6.62	4.03	48.6%
2-Wash Corn Stover	43.8	5.9	0.4	49.8	354.24	5.65	4.93	37.2%
4-Wash Corn Stover	44.6	6.1	0.5	48.8	350.11	6.68	4.00	49.1%
6-Wash Corn Stover	44.9	6.2	0.4	48.6	408.86	5.43	4.76	39.4%
8-Wash Corn Stover	45.0	6.1	0.3	48.6	319.18	4.84	5.26	33.0%

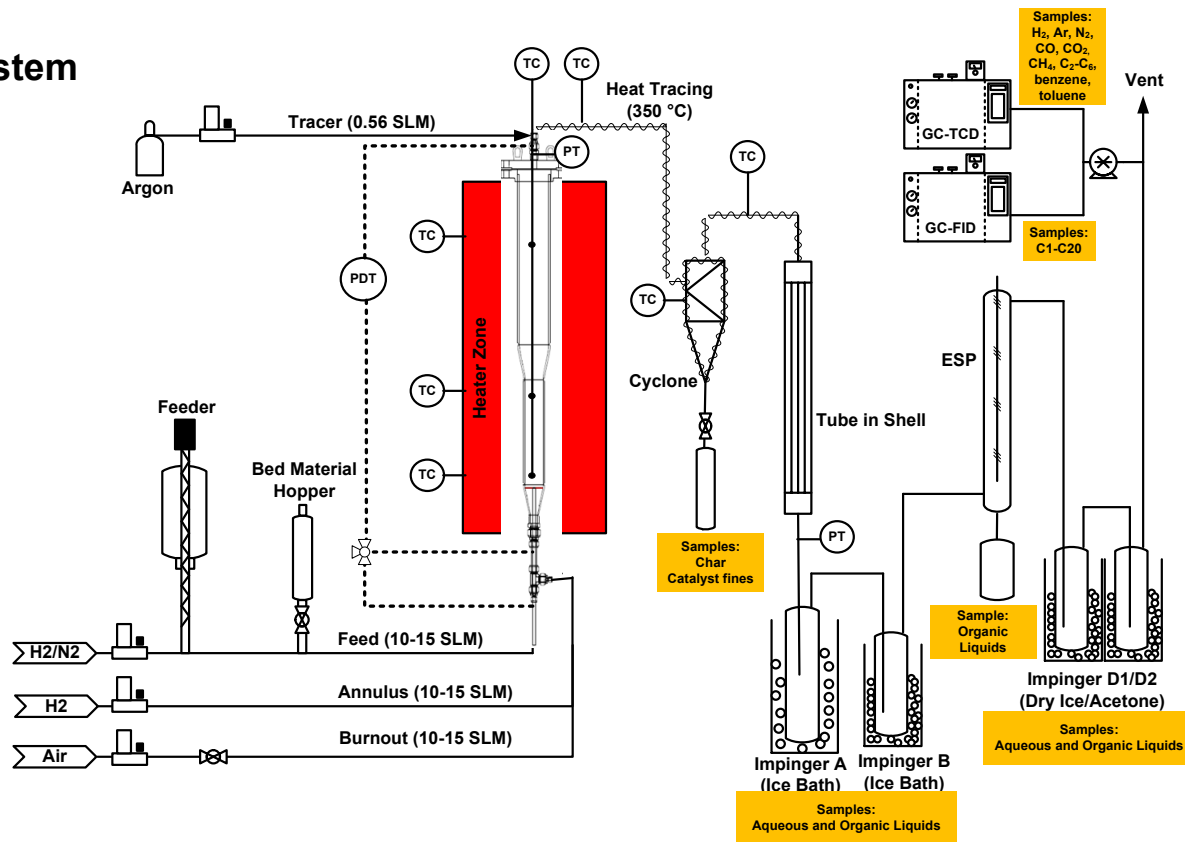
Elemental Ash Composition

	Ca (ppm)	Mg (ppm)	P (ppm)	K (ppm)	Na (ppm)	Total (ppm)
Raw as received	1685	1679	472	2462	64	6362
Washed biomass 1 wash	2314	1556	302	2066	55	6293
Washed biomass 2 wash	1832	1382	219	1370	117	4920
Washed biomass 4 wash	1645	1626	649	686	107	4712
Washed biomass 6 wash	1947	1440	257	658	60	4361
Washed biomass 8 wash	1429	1028	210	493	53	3212

Effect of Feedstock on Biocrude Composition - CFP at 450°C

The effect of preprocessing corn stover to remove metals on biocrude yield and composition

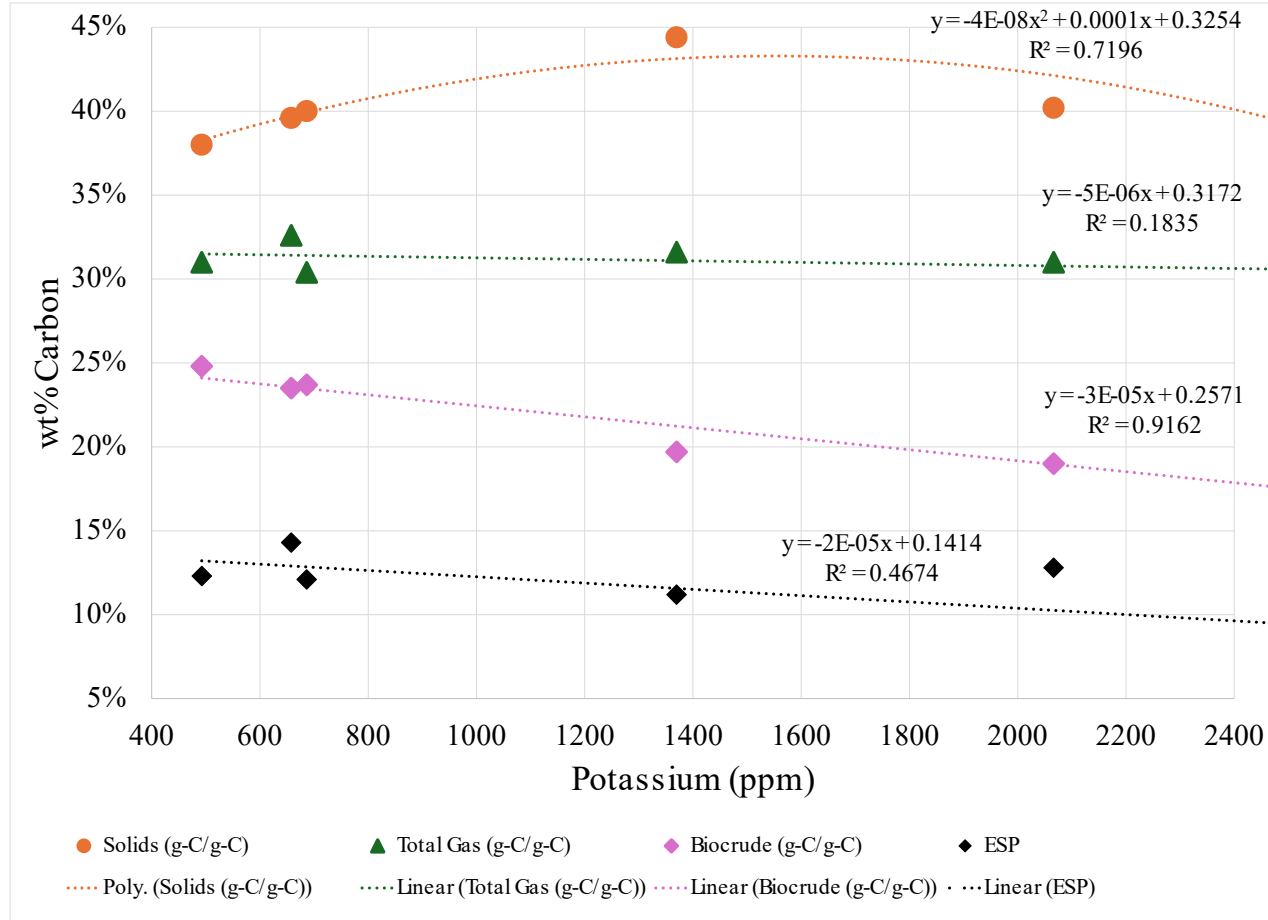
6-cm FBR Reactor System



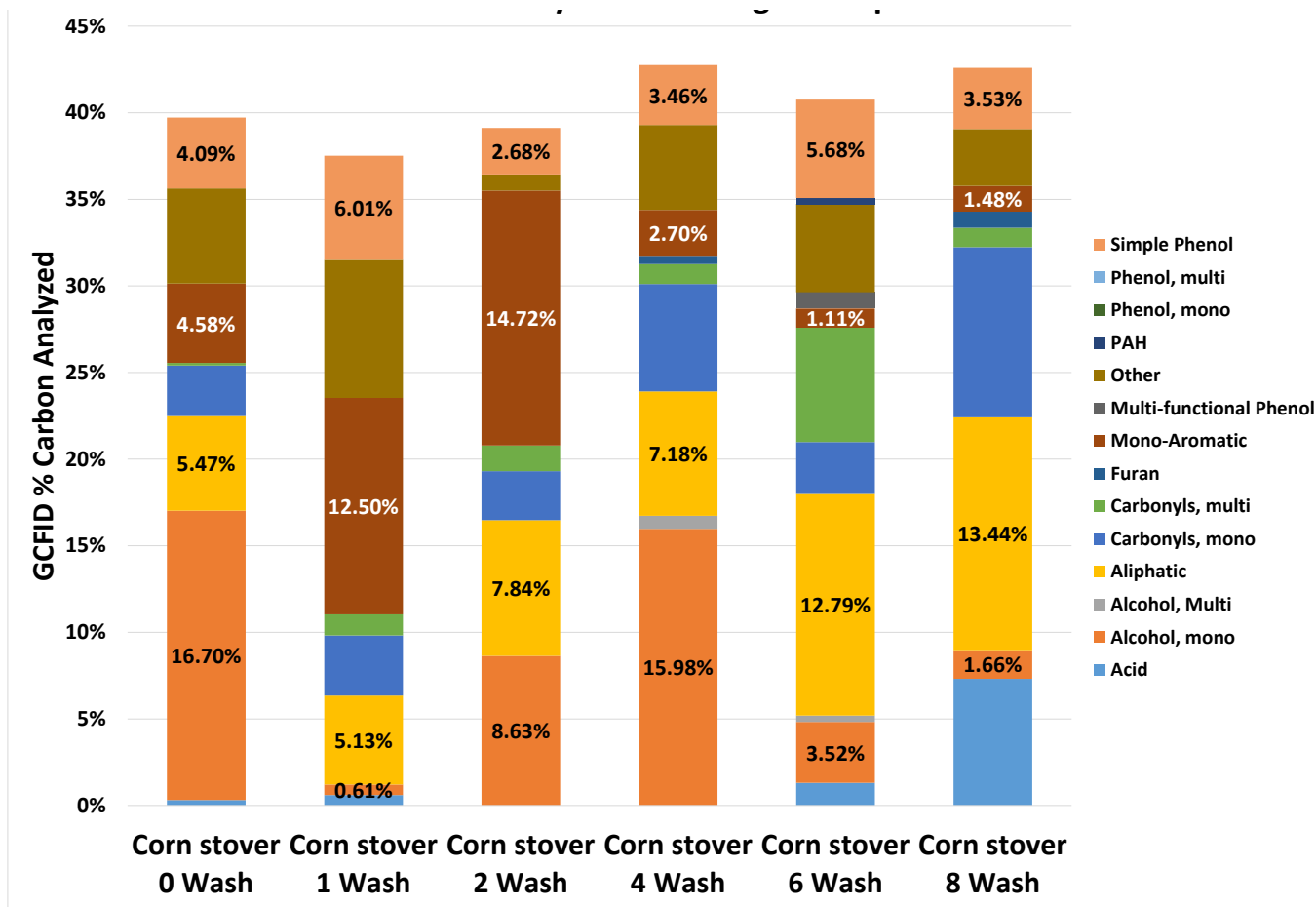
Corn Stover CFP Carbon Balances

(grams C)	Average (St. Dev)					
Feed type	Raw CS	1-Wash CS	2-Wash CS	4-Wash CS	6-Wash CS	8-Wash CS
Biocrude (g-C/g-C)	18.3% (0.2%)	19.0% (0.9%)	19.7% (3.0%)	23.7% (0.8%)	23.5% (1.3%)	24.8% (1.4%)
Imp A	8.4% (1.2%)	5.2% (1.3%)	7.7% (2.3%)	10.0% (2.1%)	8.0% (1.4%)	10.2% (1.3%)
Imp B	0.7% (1.0%)	0.0% (0.0%)	0.0% (0.0%)	0.0% (0.0%)	0.0% (0.0%)	0.5% (0.7%)
ESP	7.6% (2.3%)	12.8% (0.1%)	11.2% (0.0%)	12.1% (2.2%)	14.3% (0.1%)	12.3% (0.3%)
Imp D	1.6% (0.3%)	1.1% (0.4%)	0.8% (0.6%)	1.6% (0.7%)	2.5% (2.0%)	1.8% (0.8%)
Aqueous (g-C/g-C)	6.4% (1.1%)	7.8% (1.3%)	6.9% (0.8%)	8.8% (4.2%)	8.0% (2.8%)	7.8% (0.2%)
Imp A	5.3% (0.8%)	6.5% (1.4%)	5.3% (0.4%)	7.3% (4.2%)	6.5% (2.5%)	6.2% (0.2%)
Imp B	0.4% (0.1%)	0.5% (0.1%)	0.6% (0.1%)	0.5% (0.1%)	0.6% (0.2%)	0.7% (0.2%)
ESP	0.0% (0.0%)	0.0% (0.0%)	0.0% (0.0%)	0.0% (0.0%)	0.0% (0.0%)	0.0% (0.0%)
Imp D	0.7% (0.1%)	0.9% (0.0%)	1.0% (0.3%)	1.0% (0.1%)	0.9% (0.1%)	1.0% (0.1%)
Solids (g-C/g-C)	40.6% (1.5%)	40.2% (8.3%)	44.4% (6.9%)	40.0% (4.3%)	39.6% (4.9%)	38.0% (1.3%)
Total Gas (g-C/g-C)	30.2% (0.6%)	31.0% (5.4%)	31.6% (4.7%)	30.4% (4.6%)	32.6% (0.6%)	31.0% (0.1%)
C₁-C₃ gas	5.5% (0.8%)	5.9% (3.5%)	6.0% (3.7%)	6.4% (3.3%)	7.6% (1.0%)	6.4% (0.1%)
C₄⁺ Gas	4.7% (0.0%)	5.0% (0.8%)	5.3% (0.5%)	4.3% (0.3%)	4.5% (0.0%)	4.7% (0.1%)
CO	10.1% (0.6%)	11.8% (0.9%)	12.0% (0.4%)	11.7% (1.0%)	12.5% (0.4%)	12.4% (0.4%)
CO₂	9.9% (1.8%)	8.3% (0.1%)	8.3% (0.0%)	7.9% (0.9%)	8.0% (0.1%)	7.5% (0.2%)
“Uncondensed”	0.1% (0.1%)	0.1% (0.1%)	0.1% (0.0%)	0.1% (0.0%)	0.1% (0.0%)	0.1% (0.0%)
Ceff	23.0% (0.2%)	24.1% (1.8%)	25.0% (3.4%)	28.1% (0.9%)	28.1% (1.3%)	29.6% (1.5%)
Carbon Balance	95.3% (3.1%)	97.9% (0.8%)	102.4% (1.6%)	102.9% (2.9%)	103.6% (2.8%)	101.5% (0.3%)
Mass Balance	96.0% (1.6%)	96.3% (0.1%)	97.6% (0.5%)	98.6% (3.1%)	97.2% (5.9%)	100.1% (0.1%)
Biocrude wt%O-dry	23.5% (0.3%)	28.7% (2.1%)	33.4% (9.4%)	29.0% (8.1%)	27.7% (1.4%)	31.7% (1.5%)

Impact of Potassium on Yields

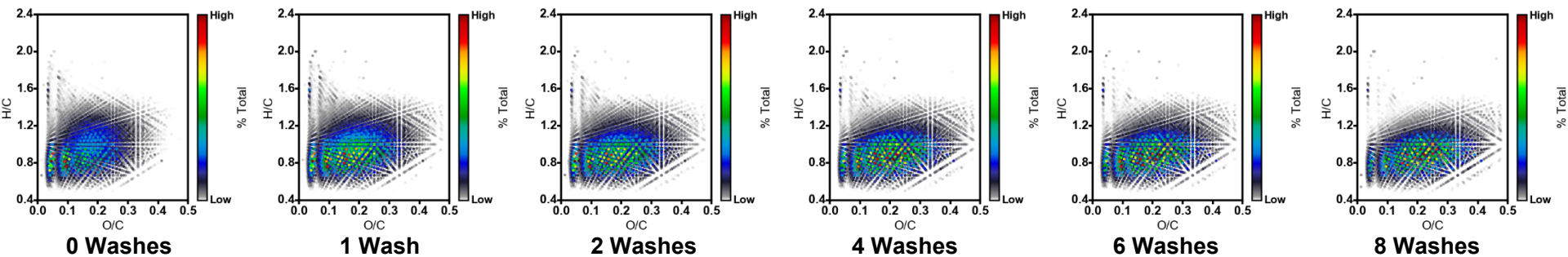


GCFID Analysis of ESP Organic Liquids

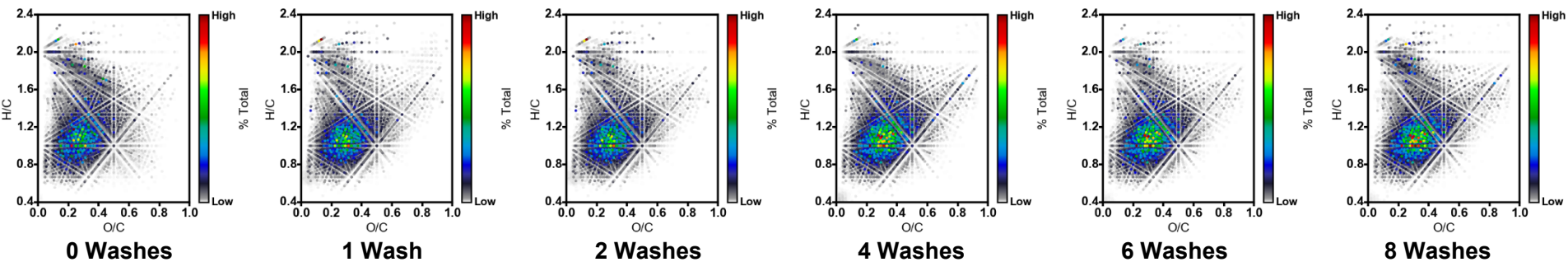


Van Krevelen Diagrams from FT-ICR Mass Spectrometry Results

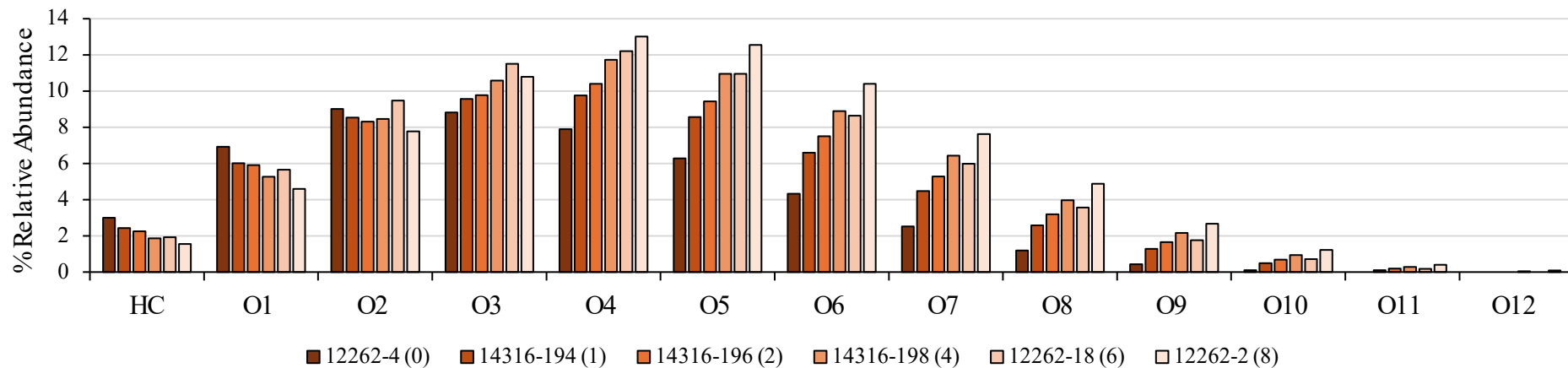
(+) APPI 9.4T



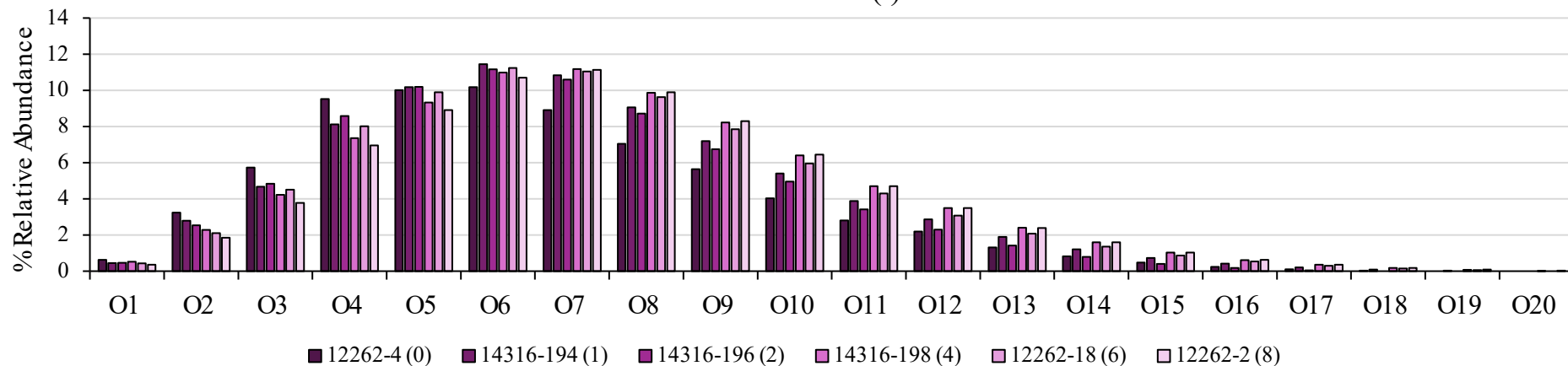
(-) ESI 21T



HC and Ox Class Distributions (+) APPI9.4T



Ox Class Distributions (-) ESI21T



Summary

Pretreating corn stover can improve biocrude yields but has little effect on the chemical composition.

Potassium shows a direct impact on biocrude yields

- Higher potassium content in the feed produces lower biocrude yields

FT-ICR results show an insignificant change in chemical composition of biocrude

- Higher wash cycles tend to produce slightly higher oxygenate species and lower hydrocarbons

Future work:

- Operate a 1TPD-scale CFP process to produce high-quality biocrude
- Upgrade biocrude in RTI's pilot-scale hydrotreater and distill hydrotreated (HDT) products in bench-scale separation units to recover SAF
- Correlate accelerated aging tests at NLR with hydrotreating performance

Acknowledgements



David Dayton
Andrew Jones
Kelly Amato

Current Project Partners



Dave Carlson



Ryan P. Rodgers
Martha L. Aguilera
Olivia C. Moss



U.S. DEPARTMENT
of **ENERGY**

DE-EE0010457: “A Corn Stover Pyrolysis Pathway for Sustainable Aviation Fuel