

A Appendices

A.1 Scopus and Web of Science Queries

Web of Science

TS=(technology OR process OR conversion OR treatment) AND TS=(waste OR by-product OR byproduct) AND TS=(organic OR bio OR biodegradable) NOT TS=(rankine OR desalination)

Refined by: LANGUAGES: (ENGLISH)

Scopus

TITLE-ABS-KEY (technology OR process OR conversion OR treatment) AND TITLE-ABS-KEY (waste OR by-product OR byproduct) AND TITLE-ABS-KEY (organic OR bio OR biodegradable) AND NOT TITLE-ABS-KEY (rankine OR desalination)

A.2 Supporting Information for List of TAPs

A.2.1 Wikipedia Categories

These are the 85 categories located while searching for bio-economy related topics. All of the article titles in these categories were compiled into a list of 779 articles, which was then further filtered by hand into the list shown in the next section. This list was further augmented by the terms listed by ? in a survey of chemical production from biomass sources.

- | | | |
|----------------------------------|-----------------------------|-----------------------------------|
| • Alcohol_fuels | • Biotechnology_products | • Mechanical_biological_treatment |
| • Algaculture | • Bone_products | • Non-timber_forest_products |
| • Algae_biofuels | • Cogeneration | • Nut_oils |
| • Alternative_energy | • Composting | • Organic_fertilizers |
| • Alternative_fuels | • Distributed_generation | • Pet_foods |
| • Anaerobic_digestion | • Engineered_wood | • Plywood |
| • Anaerobic_digester_types | • Environmental_engineering | • Pyrolysis |
| • Animal_fat_products | • Essential_oils | • Recycling |
| • Animal_waste_products | • Ethanol_fuel | • Recycling_by_material |
| • Animal_products | • Feces | • Renewable_energy |
| • Appropriate_technology | • Fermented_beverages | • Renewable_energy_technology |
| • Aquaculture | • Fermented_foods | • Renewable_fuels |
| • Aquaponics | • Fish_products | • Resins |
| • Aviation_fuels | • Flotation_processes | • Sewerage |
| • Bamboo | • Forest_products | • Sewerage_infrastructure |
| • Biodegradable_materials | • Fuels | • Sustainable_energy |
| • Biodegradable_plastics | • Fuel_cells | • Sustainable_technologies |
| • Biodegradable_waste_management | • Green_chemistry | • Synthetic_fuels |
| • Biodegradation | • Guano | • Synthetic_fuel_technologies |
| • Biodiesel | • Horse_products | • Thermal_treatment |
| • Bioenergy | • Hydrogen | • Urine |
| • Biofuels | • Hydroponics | • Vegetable_oils |
| • Biofuels_technology | • Incineration | • Waste |
| • Biological_waste | • Industrial_composting | • Waste_management |
| • Biomass | • Insect_products | • Waste_treatment_technology |
| • Biopharmaceuticals | • Landfill | • Water_treatment |
| • Bioplastics | • Liquefied_petroleum_gas | • Wood_fuel |
| • Bioremediation | • Liquid_fuels | • Wood_products |
| | • Meat_industry | |

A.2.2 List of TAPs

The following shows our final list of TAPs, grouped by general classes. As mentioned, this list and the classification used are not meant to be authoritative, but is meant to show the range of TAPs that we are able to scan for in the literature collected. The Wikipedia URLs mentioned are the titles that we filter for from the output of DBpedia Spotlight. In this article, we do not analyze the contents of any Wikipedia article, but rather use the titles as a means of building up a list of items to scan for in academic literature.

This list was further augmented by the terms listed by ? in a survey of chemical production from biomass sources. The categories “Biomass Feedstocks”, “Building Blocks”, “Intermediates”, “Intermediate Platforms” and “Secondary Chemicals” come from this reference.

Category	Preferred Label	Alternative Labels	Wikipedia URL
Agriculture	aerated static pile composting		Aerated static pile composting
Agriculture	animal feed	animal feeds	Animal feed
Agriculture	aquaculture	aquacultures	Aquaculture
Agriculture	compost	composts	Compost
Agriculture	fertilizer	fertilizers biofertilizer biofertilizers	Fertilizer
Agriculture	fish farming		Fish farming
Agriculture	green manure	green manures	Green manure
Agriculture	herbicide	herbicides bioherbicide bioherbicides	Herbicide
Agriculture	humic acid	humic acids	Humic acid
Agriculture	humus		Humus
Agriculture	mulch	mulches	Mulch
Agriculture	mycoremediation		Mycoremediation
Agriculture	organic fertilizer	organic fertilizers	Organic fertilizer
Agriculture	pesticide	pesticides	Pesticide
Agriculture	vermicompost	vermicomposts	Vermicompost
Agriculture	windrow composting		Windrow composting

Category	Preferred Label	Alternative Labels	Wikipedia URL
Application	bioadhesive	bioadhesives	Bioadhesive
Application	biofilter	biofilters	Biofilter
Application	bioremediation	bioremediations	Bioremediation
Application	biosorption	biosorptions	Biosorption
Application	chelating agent	chelating agents	Chelating agents
Application	composite	composite material composite materials composites bio composite bio composites biodegradable composites biocomposite biocomposites green composites polymer composites polymer matrix composites	Composite
Application	constructed wetland	constructed wetlands	Constructed wetland
Application	cosmetic	cosmetics	Cosmetic
Application	denitrification	denitrifications	Denitrification
Application	desiccant	desiccants	Desiccant
Application	emulsifier	emulsifiers	Emulsifiers
Application	essential oil	essential oils	Essential oil
Application	humectant	humectants	Humectant
Application	nanofiltration		Nanofiltration
Application	plasticizer	plasticizers	Plasticizer
Application	resin	resins	Resin
Application	solvent	solvents green solvent green solvents	Solvent
Application	surfactant	surfactants	Surfactant

Category	Preferred Label	Alternative Labels	Wikipedia URL
Biomass Feedstocks	cellulose	celluloses	Cellulose
Biomass Feedstocks	chitin	chitins	Chitin
Biomass Feedstocks	collagen	collagens	Collagen
Biomass Feedstocks	hemicellulose	hemicelluloses	Hemicellulose
Biomass Feedstocks	lignin	lignins	Lignin
Biomass Feedstocks	oil	oils	Oil
Biomass Feedstocks	protein	proteins	Protein
Biomass Feedstocks	starch	starches	Starch
Biomass Feedstocks	suberin		Suberin

Category	Preferred Label	Alternative Labels	Wikipedia URL
Building Blocks	3-Hydroxy-propionate		
Building Blocks	5 hydroxymethyl furfural	5 hydroxymethyl furfurals hydroxymethyl furfural	
Building Blocks	acetoin		Acetoin
Building Blocks	aconitic acid	aconitic acids	Aconitic acid
Building Blocks	arabitol		Arabitol
Building Blocks	aspartic acid	aspartic acids	Aspartic acid
Building Blocks	citric acid	citric acids	Citric acid
Building Blocks	ferulic acid	ferulic acids	Ferulic acid
Building Blocks	fischer tropsch liquids	fischer tropsch synthesis	Fischer-Tropsch process
Building Blocks	fumaric acid	fumaric acids	Fumaric acid
Building Blocks	furfural	furfurals	Furfural
Building Blocks	gallic acid	gallic acids	Gallic acid
Building Blocks	glucaric acid	glucaric acids	Glucaric acid
Building Blocks	gluconic acid	gluconic acids	Gluconic acid
Building Blocks	glutamic acid	glutamic acids	Glutamic acid
Building Blocks	glycerol		Glycerol
Building Blocks	higher alcohols		Higher alcohols
Building Blocks	hydrogen	hydrogens	Hydrogen
Building Blocks	itaconic acid		Itaconic acid
Building Blocks	lactic acid	lactic acids	Lactic acid
Building Blocks	levulinic acid	levulinic acids	Levulinic acid
Building Blocks	lysine		Lysine
Building Blocks	malic acid	malic acids	Malic acid
Building Blocks	malonic acid	malonic acids	Malonic acid
Building Blocks	methanol		Methanol
Building Blocks	mixed alcohol	mixed alcohols	
Building Blocks	Oxo synthesis products		Hydroformylation
Building Blocks	propionic acid	propionic acids	Propionic acid
Building Blocks	serine		Serine
Building Blocks	sorbitol		Sorbitol
Building Blocks	succinic acid	succinic acids	Succinic acid
Building Blocks	threonine		Threonine
Building Blocks	xylitol		Xylitol
Building Blocks	xylonic acid	xylonic acids	Xylonic acid

Category	Preferred Label	Alternative Labels	Wikipedia URL
Energy	alcohol fuel	alcohol fuels	Alcohol fuel
Energy	anaerobic digestion	anaerobic digestions	Anaerobic digestion
Energy	biochar	biochars bio char bio chars	Biochar
Energy	biodiesel	biodiesels biodiesel production biodiesel productions	Biodiesel
Energy	biofuel	biofuels	Biofuel
Energy	biogas		Biogas
Energy	biohydrogen		Biohydrogen
Energy	briquette	briquets briquette production briquettes briquetting bio briquette bio briquettes biomass briquettes fuel	Briquette
Energy	cellulosic ethanol		Cellulosic ethanol
Energy	cofiring		Cofiring
Energy	cogeneration		Cogeneration
Energy	combustion	combustions	Combustion
Energy	ethanol fuel	ethanol fuels ethanol	Ethanol fuel
Energy	fuel cell	fuel cells	Fuel cell
Energy	fuel oil	fuel oils	Fuel oil
Energy	gasification	gasifications	Gasification
Energy	hydrogen storage		Hydrogen storage
Energy	hydrothermal liquefaction	hydrothermal liquefactions	Hydrothermal liquefaction
Energy	incineration	incinerations	Incineration
Energy	jet fuel	jet fuels	Jet fuel
Energy	liquid hydrogen	liquid hydrogens	Liquid hydrogen
Energy	methane	methanes	Methane
Energy	methanol fuel	methanol fuels	Methanol fuel
Energy	microbial fuel cell	microbial fuel cells	Microbial fuel cell
Energy	pyrolysis		Pyrolysis
Energy	pyrolysis gasoline		Pyrolysis gasoline
Energy	pyrolysis oil	pyrolysis oils	Pyrolysis oil
Energy	synthetic fuel	synthetic fuels	Synthetic fuel
Energy	thermal depolymerization		Thermal depolymerization
Energy	thermal hydrolysis		Thermal hydrolysis
Energy	torrefaction		Torrefaction
Energy	wood fuel	wood fuels	Wood fuel

Category	Preferred Label	Alternative Labels	Wikipedia URL
Intermediate Platforms	arabinose		Arabinose
Intermediate Platforms	fructose		Fructose
Intermediate Platforms	glucose		Glucose
Intermediate Platforms	lactose		Lactose
Intermediate Platforms	sucrose		Sucrose
Intermediate Platforms	sugar	sugars	Sugar
Intermediate Platforms	syngas		Syngas
Intermediate Platforms	xylose		Xylose

Category	Preferred Label	Alternative Labels	Wikipedia URL
Intermediates	fuel oxygenate	fuel oxygenates	Fuel oxygenate additive
Intermediates	Green solvents		Green solvents
Intermediates	Phenol-formaldehyde resins		Phenol formaldehyde resin
Intermediates	polyacrylamide	polyacrylamides	Polyacrylamides
Intermediates	polyacrylate	polyacrylates	Polyacrylates
Intermediates	polyamide	polyamides	Polyamide
Intermediates	polycarbonate	polycarbonates	Polycarbonate
Intermediates	polyhydroxyalkanoate	polyhydroxyalkanoates	Polyhydroxyalkanoates
Intermediates	polysaccharide	polysaccharides	Polysaccharide
Intermediates	polyurethane	polyurethanes	Polyurethane
Intermediates	polyvinyl acetate	polyvinyl acetates	Polyvinyl acetate
Intermediates	polyvinyl alcohol	polyvinyl alcohols	Polyvinyl alcohol

Category	Preferred Label	Alternative Labels	Wikipedia URL
Materials	activated carbon	activated carbons	Activated carbon
Materials	activated sludge	activated sludges	Activated sludge
Materials	bioplastic	bioplastics biodegradable plastic biodegradable plastics	Bioplastic
Materials	biorefinery	biorefining	Biorefinery
Materials	isoprene	isoprenes	Isoprene
Materials	natural rubber	natural rubbers	Natural rubber
Materials	nylon	nylons	Nylons
Materials	particle board	particle boards	Particle board
Materials	polymer	polymers biopolymer biopolymers	Polymer

Category	Preferred Label	Alternative Labels	Wikipedia URL
Secondary Chemicals	1,3-propanediol		1,3-Propanediol
Secondary Chemicals	1,4-butanediol		1,4-Butanediol
Secondary Chemicals	1,4-diol		
Secondary Chemicals	1,5-diaminopentane		1,5-Diaminopentane
Secondary Chemicals	1,5-pentanediol		1,5-Pentanediol
Secondary Chemicals	2-Methyl THF		2-Methyl-THF
Secondary Chemicals	acetic acid	acetic acids	Acetic acid
Secondary Chemicals	acid	acids	Acid
Secondary Chemicals	acrylamide	acrylamides	Acrylamide
Secondary Chemicals	acrylate	acrylates	Acrylate
Secondary Chemicals	alcohol	alcohols	Alcohol
Secondary Chemicals	aldehyde	aldehydes	Aldehyde
Secondary Chemicals	butanediol	butanediols	Butanediol
Secondary Chemicals	butanol	butanols	Butanol
Secondary Chemicals	butenoic acid		Butenoic acid
Secondary Chemicals	caprolactam		Caprolactam
Secondary Chemicals	diacid	diacids	Diacid
Secondary Chemicals	dialdehyde	dialdehydes	Dialdehyde
Secondary Chemicals	diamine	diamines	Diamine
Secondary Chemicals	diesel	diesels diesel fuel diesel fuels	Diesel
Secondary Chemicals	Dilactones		Dilactones
Secondary Chemicals	dimethylcarbonate		Dimethyl carbonate
Secondary Chemicals	dimethylether		Dimethyl ether
Secondary Chemicals	diol	diols	Diol
Secondary Chemicals	dioxane	dioxanes	Dioxanes
Secondary Chemicals	epoxide	epoxides	Epoxide
Secondary Chemicals	ester	esters	Ester
Secondary Chemicals	ethylene glycol	ethylene glycols	Ethylene glycol
Secondary Chemicals	food additive	food additives	Food additive
Secondary Chemicals	formaldehyde		Formaldehyde
Secondary Chemicals	furan derivative	furan derivatives	
Secondary Chemicals	gasoline	gasolines	Gasoline
Secondary Chemicals	Gluconolactones		Gluconolactonase
Secondary Chemicals	glutaric acid	glutaric acids	Glutaric acid
Secondary Chemicals	hydroxy furans		Hydroxyfuranone
Secondary Chemicals	hydroxybutyrate	hydroxybutyrates	Hydroxybutyrates
Secondary Chemicals	hydroxybutyric acid	hydroxybutyric acids	Hydroxybutyric acid
Secondary Chemicals	isobutene		Isobutylene
Secondary Chemicals	isosorbide		Isosorbide
Secondary Chemicals	ketone derivative		

Category	Preferred Label	Alternative Labels	Wikipedia URL
Secondary Chemicals	lactate	lactates	Lactate
Secondary Chemicals	lactide	lactides	Lactide
Secondary Chemicals	lactone	lactones	Lactone
Secondary Chemicals	methyl ester	methyl esters	Methyl ester
Secondary Chemicals	methylamines	dimethylamines	Methylamine
Secondary Chemicals	mtbe	methyl tert-butyl ether	Methyl tert-butyl ether
Secondary Chemicals	olefin	olefins	Olefins
Secondary Chemicals	phenolic	phenolics	Phenolic
Secondary Chemicals	polyester	polyesters	Polyester
Secondary Chemicals	polyethylene glycol	polyethylene glycols	Polyethylene glycol
Secondary Chemicals	propyl alcohol	propyl alcohols	Propyl alcohol
Secondary Chemicals	propylene glycol	propylene glycols	Propylene glycol
Secondary Chemicals	pyrrolidone		Pyrrolidine
Secondary Chemicals	reagent	reagents	Reagent
Secondary Chemicals	succinate	succinates	Succinate
Secondary Chemicals	sugar acid	sugar acids	Sugar acid
Secondary Chemicals	thf	tetrahydrofuran	Tetrahydrofuran
Secondary Chemicals	unsaturated esters		
Secondary Chemicals	wax	waxes	Wax
Secondary Chemicals	α -olefins		α -olefin
Secondary Chemicals	γ -butyrolactone		
Secondary Chemicals	δ -aminolevulinate		δ -aminolevulinate

A.3 List of Wastes

A.3.1 List of Waste Sources

- abattoir
- alfalfa
- algae
- almond
- apple
- apricot
- aquaculture
- babassu
- bamboo
- banagrass
- banana
- barley
- bean
- beef
- beer
- beet
- bivalve
- bovine
- brewery
- broccoli
- cabbage
- cacao
- cane
- canola
- cardboard
- carpet
- cashew
- cashew nut
- cassava
- castor
- castor bean
- cattle
- cheese
- cherry
- chestnut
- chicken
- clam
- coconut
- coffee
- corn
- cotton
- cotton gin
- cow
- cranberry
- crustacean
- cucumber
- dairy
- date
- date palm
- demolition
- distillery
- duck
- durian
- dye
- earthworm
- egg
- eucalyptus
- farm
- farmyard
- fish
- fishery
- flax
- forest
- fungi
- furniture
- garden
- gastropod
- goat
- grape
- greenhouse
- groundnut
- guar
- guayule
- hair dye
- hardwood
- hardwood kraft
- hazelnut
- hemp
- hen
- hog
- horse
- horticultural
- household
- hyacinth
- jatropa
- jute
- kenaf
- kitchen
- kraft
- kraft mill
- leather
- lettuce
- linseed
- livestock
- lobster
- longan
- lucerne
- lychee
- maize
- malt
- mango
- melon
- milk
- mill
- mill kraft
- mushroom
- mussel
- mustard
- neem
- newspaper
- newsprint
- oak
- oat
- oat mill
- oil palm
- okra
- olive
- olive mill
- onion
- orange
- oyster
- palm
- paper
- paper mill
- pea
- peach
- peanut
- pecan
- pig
- pig farm
- piggery
- pineapple
- pine
- pistachio
- plum
- pomegranate
- poplar
- potato
- poultry
- prawn
- prune
- rabbit
- radish
- rapeseed
- rice
- rice mill
- rubber
- sago
- seafood
- seaweed
- sesame
- slaughterhouse
- sheep
- shrimp
- shrimp farm
- sisal
- slag
- snail
- softwood
- softwood kraft

- | | | | | |
|-------------|--------------|-------------|-----------|-------------------|
| • sorghum | • sugar | • sunflower | • tobacco | • wine |
| • soy | • sugar beet | • swine | • tofu | • wine distillery |
| • soya | • sugarcane | • tannery | • tomato | • winery |
| • soybean | • sugar cane | • tapioca | • turkey | • wood |
| • spirulina | • sugar mill | • tea | • walnut | • yeast |
| • spruce | • sugar palm | • textile | • wheat | |

A.3.2 List of Waste Descriptors

- | | | | | |
|----------------|---------------------|-----------------|---------------|------------------|
| • ash | • cob | • frond | • needle | • skin |
| • backwash | • coir | • fruit | • nut | • slag |
| • backwashing | • collagen | • fruit bunch | • offal | • slaughter |
| • bagasse | • compost | • garbage | • oil | • slaughterhouse |
| • bale | • concentrate | • gluten | • oilseed | • sludge |
| • bark | • cone | • grain | • packaging | • slurry |
| • barkdust | • contaminated | • grease | • particulate | • solid waste |
| • bedding | • core | • ground | • paste | • soot |
| • biochar | • crop | • guano | • peat | • spent |
| • biosolid | • curd | • gum | • peel | • spill |
| • biowaste | • cutting | • hair | • pellet | • stable |
| • biproduct | • debris | • hay | • pit | • stalk |
| • bi-product | • digestate | • hemicellulose | • pith | • stall |
| • bleach | • discard | • hoof | • plant | • starch |
| • bleached | • discarded | • hooves | • pod | • stem |
| • block | • distillate | • horn | • pole | • stick |
| • blood | • dreg | • horns | • pomace | • stone |
| • blood meal | • dross | • hull | • powder | • stover |
| • bone | • dung | • husk | • press | • straw |
| • bone ash | • dust | • interceptor | • protein | • stump |
| • bone char | • effluent | • intestine | • pulp | • suet |
| • bone meal | • egg | • juice | • pulping | • syrup |
| • bran | • eggshell | • kernel | • recovery | • tailing |
| • bunch | • empty bunch | • lagoon | • reject | • tannin |
| • byproduct | • emulsion | • leachate | • residual | • tar |
| • by product | • excreta | • leaf | • residue | • tendon |
| • cake | • faecal | • leave | • resin | • toxic |
| • carbohydrate | • faeces | • lignin | • root | • trash |
| • carcass | • fat | • lint | • sawdust | • trimming |
| • cardboard | • feather | • liquor | • scale | • trunk |
| • carton | • feces | • litter | • scrap | • tuber |
| • cellulose | • fiber | • manure | • screening | • urea |
| • chaff | • fibre | • marc | • seed | • urine |
| • char | • fibres | • meal | • sewage | • vinasse |
| • charcoal | • filter | • meat | • shaving | • vine |
| • chip | • flour | • milling | • shell | • waste |
| • chipping | • fly ash | • molasses | • shoot | • wastewater |
| • chips | • food waste | • mold | • shredder | • wax |
| • coating | • forage | • mud | • silage | • whey |
| | • fresh fruit bunch | • mulch | • skimming | • wool |

A.3.3 Final List of Wastes

Category	Preferred Label	Alternative Labels
alfalfa	alfalfa forage	
alfalfa	alfalfa hay	
alfalfa	alfalfa powders	
algae	algae meal	
almond	almond meal	
almond	almond shells	
apple	apple filter cake	
apple	apple juice	
apple	apple pomace	
apple	apple waste	
apricot	apricot stones	
aquaculture	aquaculture effluent	aquaculture effluents aquaculture wastewater
aquaculture	aquaculture waste	aquaculture wastes
babassu	babassu cake	
bamboo	bamboo charcoal	
bamboo	bamboo dust	
bamboo	bamboo wastewater	bamboo industry wastewater
bamboo	bamboo leaves	
bamboo	bamboo vinegar	
banana	banana leaf	
banana	banana peel	
banana	banana pseudo stem	
banana	banana stem waste	
banana	banana waste	banana wastes
barley	barley starch	
barley	barley straw	
barley	barley waste	
bean	bean curd manufacturing waste	
bean	bean dregs	
bean	bean pods	
beet	beet pulp	
brewery	brewery sludge	brewery slurry brewery waste water sludge
brewery	brewery waste	beer brewery waste
brewery	brewery wastewater	brewery waste water brewery wastewater treatment brewery effluent beer brewery wastewater brewery bio effluent
broccoli	broccoli residue	
cabbage	cabbage waste	
carpet	carpet dyeing wastewater	
carpet	carpet waste	

Category	Preferred Label	Alternative Labels
cassava	cassava bagasse	
cassava	cassava dregs	
cassava	cassava fibrous residue	
cassava	cassava hay	
cassava	cassava meal	cassava root meal
cassava	cassava peel	cassava peels
cassava	cassava pulp	
cassava	cassava starch	tapioca starch
cassava	cassava starch wastewater	tapioca starch wastewater cassava starch fermentation wastewater cassava starch extraction wastew- ater
cassava	cassava waste	cassava wastes tapioca solid waste
cassava	cassava wastewater	cassava mill wastewater
castor	castor bean cake	castor cake
cattle	beef suet	
cattle	bovine bone	
cattle	bovine hair	
cattle	cattle manure	cattle dung cattle manures beef manure livestock manure livestock manures cow dung cowdung cow manure bovine manure fresh cow manure dairy cattle manure dairy manure dairy manures cattle feces cow feces beef cattle manure beef cattle feedlot manure livestock excreta
cattle	cattle slaughterhouse wastewa- ter	
cattle	cattle slurry	cow dung slurry livestock sludge
cattle	cattle waste	livestock waste livestock wastes
cattle	cattle wastewater	livestock wastewater livestock effluents
cattle	cow dung ash	
cattle	cow slurry	
cattle	cow urine	
cattle	livestock manure digester liquor	
cheese	cheese wastewater	cheese processing wastewater cheese industry wastewater
cheese	cheese whey	raw cheese whey ricotta cheese whey
cheese	cheese whey wastewater	

Category	Preferred Label	Alternative Labels
coconut	coco peat	
coconut	coconut fiber	coconut fibre coconut coir coconut coir fibre coconut coir pith
coconut	coconut husk	
coconut	coconut industry wastewater	
coconut	coconut shell	coconut shells
coconut	coconut water	
coffee	coffee grounds	
coffee	coffee husk	coffee husks
coffee	coffee processing wastewater	
coffee	coffee pulp	coffee pulp waste coffee waste
coffee	coffee wastewater	coffee wet processing wastewater
coffee	spent coffee	spent coffee grounds
cotton	cotton fiber	
cotton	cotton gin trash	cotton gin waste
cotton	cotton seed oil	
cotton	cotton stalk	cotton stalks
cotton	cotton textile dyeing wastewater	
cotton	cotton waste	
cotton	cottonseed	cottonseeds
cotton	cottonseed de oiled cake	
cotton	cottonseed hulls	
cotton	cottonseed meal	
cotton	cottonseed oil	
cranberry	cranberry pomace	
cranberry	cranberry processing waste	
crustacean	crustacean waste	
dairy	dairy cow manure	dairy cattle feces
dairy	dairy effluent	dairy effluents dairy factory effluent dairy industry wastewater dairy processing wastewater dairy waste water dairy wastewater dairy wastewater treatment dairy wastewaters
dairy	dairy farm wastewater	dairy farm effluent dairy industry effluent dairy wastewater treatment plant dairy cattle slurry
dairy	dairy food wastewater	
dairy	dairy manure treatment	
dairy	dairy sewage sludge	dairy pond sludge dairy sludge dairy plant sludge dairy slurry
dairy	dairy waste	dairy wastes dairy waste streams dairy industrial waste dairy industry waste
dairy	dairy waste scum oil	

Category	Preferred Label	Alternative Labels
distillery	distillery effluent	distillery effluents
distillery	distillery sludge	distillery industry sludge
distillery	distillery spent wash	distillery spentwash
distillery	distillery vinasse	
distillery	distillery waste	distillery wastes
distillery	distillery wastewater	distillery wastewaters distillery wastewater treatment alcohol distillery wastewater
duck	duck manure	
dye	dye waste	
dye	dye wastewater	dye waste water dye wastewater treatment dye wastewaters dyeing wastewater dyestuff wastewater dyeing effluents dyehouse effluent dyehouse effluents dye effluent dye effluents dye bath effluent dye house effluent dye works wastewater dye containing wastewater dye process wastewater
egg	eggshell	eggshell waste eggshells eggshell membranes egg shell
eucalyptus	eucalyptus bark	
eucalyptus	eucalyptus ctmp effluent	
farm	farm effluents	
farm	farm waste	farm wastes
farm	farm manure	farmyard manure farm yard manure
fish	fish canning wastewater	
fish	fish faeces	
fish	fish farm effluent	
fish	fish meal	fishmeal
fish	fish offal	
fish	fish processing waste	fish processing wastes
fish	fish processing wastewater	fish processing effluent
fish	fish scale	fish scales
fish	fish waste	fish wastes fishery wastes fishery waste
fish	fish waste oil	fish oil waste fish oil
fish	fishery washing water	
fish	fishmeal wastewater	
fish	waste fish fats	
flax	flax fiber	flax fibers flax fibres

Category	Preferred Label	Alternative Labels
forest	forest waste	forest residue forest residues forestry residues forestry waste forestry wastes forest litter forest nursery waste
garden	garden waste	garden wastes
gastropod	gastropod shell	
goat	goat manure	
grape	exhausted grape marc	
grape	grape marc	grape pomace spent grape marc
grape	grape seed	grape seeds grape seed extract
grape	grape stalk	grape stalks grapevines grape vine
grape	grape waste	
greenhouse	greenhouse effluent	
greenhouse	greenhouse waste	
guar	guar gum	
guar	guar gum industrial waste	
guayule	guayule resin	
hazelnut	hazelnut cupula	hazelnut husk
hazelnut	hazelnut oil	
cattle	hoof	hooves hoofmeal hoofs
cattle	horn	horns hornmeal horn meal horn shavings
horse	horse manure	
horticulture	horticultural waste	
household waste	household hazardous waste	
household waste	household municipal solid waste	
household waste	household organic waste	household bio waste organic household waste organic household wastes source separated organic household waste kitchen organic wastes household biowaste household food waste
household waste	household sewage	
household waste	household solid organic waste	
household waste	household solid waste	
household waste	household waste	household wastes
household waste	household wastewater	
household waste	mixed household waste	
household waste	residual household waste	
household waste	source separated household waste	

Category	Preferred Label	Alternative Labels
jatropha	jatropha cake	jatropha curcas seed cake jatropha curcas linn capsule husk jatropha husk jatropha seedshell cake jatropha meal
jatropha	jatropha waste	
jute	jute dust	
jute	jute fibres	
jute	jute stick	
kenaf	kenaf fiber	
kitchen waste	kitchen garbage	kitchen waste kitchen wastes
kitchen waste	kitchen waste compost	kitchen waste composting
kitchen waste	kitchen wastewater	kitchen sink wastewater
kitchen waste	vegetable kitchen waste	
kraft	eucalyptus kraft pulp	
kraft	kraft mill effluent	kraft mill effluents kraft pulp mill effluent kraft pulp mill effluents kraft effluent kraft cellulose mill wastewater bleached kraft mill effluent bleached kraft mill effluents bleached kraft pulp mill effluent
kraft	kraft mill lignin	kraft lignin
kraft	kraft pulp	kraft pulping
leather	leather dust	
leather	leather shavings	
leather	leather waste	leather wastes
lettuce	lettuce seeds	
lucerne	lucerne hay	
maize	corn cob	corn cobs corncob corncobs
maize	corn fiber	corn fibers
maize	corn gluten meal	
maize	corn oil	
maize	corn residue	corn residues
maize	corn silage	maize silage
maize	corn stalk	corn stalks cornstalk maize stalk maize stalks
maize	corn starch	
maize	corn steep liquor	
maize	corn stover	corn stovers
maize	corn straw	maize straw
maize	corn syrup waste	
maize	corn wet milling effluent	
maize	ear corn residue	
maize	maize bran	
maize	maize starch	
maize	maize waste	

Category	Preferred Label	Alternative Labels
malt	malt bagasse	
malt	malt waste	malt wastes
malt	malting wastewater	
mango	mango peels	
milk	milk fat	
milk	milk house wastewater	
milk	milk powder	
milk	milk protein	milk proteins
milk	milk whey	
milk	waste milk	
mushroom	mushroom compost	spent mushroom compost
mushroom	mushroom waste	mushroom wastes mushroom residue
mushroom	spent mushroom substrate	spent mushroom substrates
mussel	mussel shell	mussel shells
mustard	mustard tuber wastewater	
neem	neem cake	
neem	neem leaves	
newspaper	waste newspaper	
oak	oak bark	
oak	oak sawdust	
oat	oat straw	
okra	okra gum	
olive	olive cake	wet olive cake dry olive cake
olive	olive husk	olive husks
olive	olive leaf	olive leaves
olive	olive mill solid waste	olive mill solid wastes dry olive mill residue dry olive residue olive mill residues olive solid waste two phase olive mill solid residue
olive	olive mill waste compost	olive pomace compost
olive	olive oil mill waste	olive oil mill wastes olive mill waste olive mill wastes olive oil waste olive waste olive wastes two phase olive mill waste two phase olive mill wastes olive oil industry waste olive processing waste

Category	Preferred Label	Alternative Labels
olive	olive oil mill waste water	olive oil mill waste waters olive oil mill wastewater olive oil mill wastewaters olive mill effluent olive mill effluents olive oil waste water olive oil wastewater olive oil wastewaters olive mill waste water olive mill waste waters olive mill wastewater olive mill wastewaters olive mill wastewater sludge olive mill wastewater treatment olive oil mill effluents raw olive mill wastewater olive mills wastewater olive oil processing wastewater olive plant wastewater
olive	olive oil mill wastewater sludge	olive mill sludge
olive	olive pits	olive stone olive stones
olive	olive pomace	olive mill pomace two phase olive pomace olive oil cake olive mill watery husk
olive	olive pomace leachate	
olive	olive pomace oil	
olive	olive pulp	raw olive pulp
onion	onion dehydration wastewater	
onion	onion juice	
onion	onion peels	
orange	industrial orange waste	
orange	orange juice	
orange	orange juice waste water	
orange	orange peel	orange peels orange peel waste
orange	orange waste	orange wastes
oyster	oyster shell	waste oyster shells
oyster	waste oyster	
palm	date palm leaf	
palm	date syrup waste	
palm	oil palm biomass	
palm	oil palm empty fruit bunch	oil palm empty fruit bunches
palm	oil palm frond	oil palm fronds
palm	oil palm stone	
palm	oil palm trunk	
palm	oil palm waste	
palm	palm ash	
palm	palm fatty acid distillate	
palm	palm fiber	palm press fibre
palm	palm kernel cake	
palm	palm kernel meal	
palm	palm kernel protein	
palm	palm oil fuel ash	
palm	palm oil mill effluent	palm oil mill effluents
palm	palm oil mill sludge	palm oil sludge

Category	Preferred Label	Alternative Labels
palm	palm oil mill waste	palm oil mill wastes palm oil wastes oil palm wastes
palm	palm shell	palm shells
palm	palm waste	
paper	deinking paper sludge	
paper	paper fiber	paper fibers
paper	paper pulp	
paper	paper recycling wastewater	
paper	paper sludge	paper sludges paper pulp sludge
paper	paper waste	paper wastes
paper	recycled paper sludge	
paper	waste paper	waste papers wastepaper
paper	waste paper pulp	
paper	wastepaper pulp effluents	wastepaper pulping effluent
paper miill	paper mill effluent	paper mill effluents paper industry effluent paper factory effluent paper effluent
paper miill	paper mill sludge	paper mill sludges papermill sludge
paper miill	paper mill waste	paper mill wastes paper mill waste materials
paper miill	paper mill wastewater	papermaking wastewater paper industry wastewater paper wastewater
paper miill	pulp and paper mill sludge	pulp and paper mill sludges pulp and paper sludge pulp mill sludge
paper miill	pulp and paper mill wastewater	pulp and paper mill effluent pulp and paper mill effluents pulp and paper wastewater pulp and paper wastewaters pulp and paper waste treatment systems pulp and paper industry wastewater pulp and paper industry effluents pulp and paper effluent pulp and paper effluents pulp mill effluent pulp mill effluents pulp mill wastewater
peach	peach pit	
peanut	peanut oil	
peanut	peanut shells	peanut hull
peanut	peanut skin	
pine	pine bark	
pine	pine chips	pine wood chips
pine	pine needle	pine needles
pine	pine oil	
pine	pine pulping	
pine	pine sawdust	
pineapple	pineapple juice	
pineapple	pineapple leaf	
pineapple	pineapple peel	
pineapple	pineapple pulp	
pineapple	pineapple waste	pineapple wastes

Category	Preferred Label	Alternative Labels
pistachio	pistachio by product	
pistachio	pistachio compost	
pistachio	pistachio hull waste	
pomegranate	pomegranate juice	
pomegranate	pomegranate marc	pomegranate husk
poplar	poplar wood chips	
potato	potato juice	
potato	potato peel	potato peels potato skin potato peel waste
potato	potato processing wastewater	potato wastewater potato process effluent
potato	potato pulp	
potato	potato starch	
potato	potato starch wastewater	
potato	potato waste	solid potato waste potato processing waste
poultry	chicken feather	chicken feathers chicken feather waste poultry feather poultry feathers
poultry	chicken feces	
poultry	chicken intestine	
poultry	chicken litter	poultry litter poultry litters
poultry	chicken manure	chicken manures hen manure poultry manure poultry manures solid poultry manure
poultry	chicken slurry	chicken manure slurry
poultry	poultry bedding	
poultry	poultry blood	
poultry	poultry carcasses	
poultry	poultry intestine	
poultry	poultry litter leachate	
poultry	poultry litter waste	
poultry	poultry manure compost	
poultry	poultry wastewater	poultry manure wastewater
poultry	poultry slaughterhouse waste	
poultry	poultry slaughterhouse wastewater	poultry processing wastewater poultry slaughter wastewater poultry slaughterhouse wastewater treatment plant
poultry	poultry waste	poultry wastes dried poultry waste
rabbit	rabbit manure	
rapeseed	rapeseed cake	rapeseed meal canola meal rapeseed press cake
rapeseed	rapeseed residue	
rapeseed	rapeseed straw	canola straw

Category	Preferred Label	Alternative Labels
rice	rice bran	rice brans fermented rice bran
rice	rice bran oil	
rice	rice chaff	
rice	rice hull	rice hulls
rice	rice hull ash	
rice	rice husk	rice husks
rice	rice husk ash	
rice	rice husk biochar	
rice	rice mill waste	rice residues
rice	rice seed peels	
rice	rice straw	rice straws rice straw waste rice straw residue
rubber	rubber factory waste	
rubber	rubber latex effluent	
rubber	rubber seed oil	
rubber	rubber waste	waste rubber
rubber	rubber wastewater	rubber thread wastewater
sago	sago pith waste	
sago	sago sludge	
sago	sago starch	
sago	sago waste	sago industry waste sago residue
sago	sago wastewater	sago effluent
sawmill	sawmill wastewater	
seafood	seafood wastewater	
seaweed	seaweed leachate	
sesame	sesame bark	
sheep	sheep litter	
sheep	sheep manure	
sheep	sheep wool	sheepwool
shrimp	shrimp biowaste	shrimp bio waste
shrimp	shrimp farm effluents	shrimp aquaculture wastewater shrimp pond effluent
shrimp	shrimp meal	
shrimp	shrimp shells	
shrimp	shrimp waste	shrimp wastes
sisal	sisal fiber	sisal fibre waste
sisal	sisal leaf waste leachate	
slaughterhouse	slaughterhouse waste	slaughterhouse wastes solid slaughterhouse waste abattoir waste
slaughterhouse	slaughterhouse wastewater	slaughterhouse wastewaters slaughterhouse wastewater treat- ment slaughterhouse wastewater treat- ment plant abattoir effluent abattoir wastewater slaughterhouse plant wastewater slaughterhouse effluent

Category	Preferred Label	Alternative Labels
sorghum	sorghum bagasse	sweet sorghum bagasse
sorghum	sorghum liquor waste	
sorghum	sorghum silage	
soy	soy cake	soybean meal soy meal soya oil cake
soy	soy molasses	
soy	soy residue	
soy	soy sauce wastewater	
soy	soy waste	soya waste
soy	soybean hull	soybean hulls soybean husk
soy	soybean straw	
soy	soybean waste cooking oil	
soy	soybean wastewater	soybean processing wastewater
spruce	spruce bark	
sugar	residual sugars	
sugar	sugar industry waste	sugar factory waste sugar industry wastes sugar mill waste sugar refinery waste
sugar	sugar industry wastewaters	sugar mill effluents sugar industry effluent sugar mill effluent sugar wastewater
sugar	sugar mill sludge	
sugar	sugar molasses	
sugar beet	beet molasses	beet molasses vinasse
sugar beet	beet sugar wastewater	
sugar beet	beet vinasse	
sugar beet	dried sugar beet pulp	spent sugar beet pulp
sugar beet	sugar beet molasses	
sugar beet	sugar beet processing wastewater	
sugar beet	sugar beet pulp	
sugar beet	sugar beet silage	
sugar beet	sugar beet vinasse	
sugar beet	sugar beet waste	
sugar cane	cane juice	
sugar cane	sugar cane bagasse	sugarcane bagasse sugar cane straw
sugar cane	sugar cane molasses	sugarcane molasses cane molasses
sugar cane	sugar cane vinasse	
sugar cane	sugar cane waste	
sugar cane	sugar cane wax	sugar cane crude wax
sugar cane	sugarcane bagasse ash	
sugar cane	sugarcane distillery effluent	
sugar cane	sugarcane filter cake	
sugar cane	sugarcane juice	
sugar cane	sugarcane trash	cane trash sugarcane residue
sugar cane	sugarcane vinasse	

Category	Preferred Label	Alternative Labels
sunflower	sunflower cake	sunflower oil cake
sunflower	sunflower seed husks	sunflower hulls sunflower hull
swine	pig manure	pig feces pig dung pig manures solid swine manure swine manure management systems liquid swine manure liquid hog manure liquid pig manure hog manure flushed swine manure swine manure solids swine manure swine feces
swine	pig manure compost	
swine	pig slaughterhouse sludge	
swine	pig slaughterhouse waste	
swine	pig slurry	piggery slurry swine manure slurry untreated pig slurry swine slurry swine lagoons
swine	pig waste	pig wastes piggery waste piggery wastes swine waste swine wastes hog waste
swine	pig wastewater	
swine	piggery waste treatment	
swine	piggery wastewater	piggery wastewaters piggery wastewater treatment piggery effluent raw swine wastewater swine wastewater swine wastewaters swine wastewater treatment swine waste treatment treated swine wastewater digested swine wastewater pig farm wastewater swine effluent swine lagoon swine waste lagoon swine waste slurry
swine	swine digester liquor	
tannery	tannery sludge	tannery sludges tannery sewage sludge
tannery	tannery soak liquor	
tannery	tannery solid waste	
tannery	tannery waste	tannery wastes
tannery	tannery wastewater	tannery wastewaters tannery wastewater treatment tannery waste water tannery saline wastewater tannery effluent tannery effluents leather tanning wastewater treated tannery effluent
tea	tea leaf	tea leaves
tea	tea waste	green tea waste tea production waste

Category	Preferred Label	Alternative Labels
textile	textile dye wastewater	textile dyeing wastewater textile dye effluent textile dyeing effluent
textile	textile effluent	textile effluents textile effluent treatment textile industry wastewater textile wastewater textile waste water textile wastewater treatment textile wastewaters raw textile wastewater biotreated textile wastewater
textile	textile fiber	textile fibers textile fibres
textile	textile industrial wastewater	textile industry effluent textile mill effluent textile preparation effluent textile wastewater effluent
textile	textile industry sludge	textile sludge textile wastewater sludge
textile	textile washing	
textile	textile waste	
tobacco	tobacco bio oil	
tobacco	tobacco dust	
tobacco	tobacco waste	tobacco wastes tobacco residues tobacco solid waste
tobacco	tobacco wastewater	
tofu	tofu waste	tofu processing waste tofu residue tofu liquid waste
tomato	tomato peel	tomato peels
tomato	tomato pomace	
tomato	tomato processing wastewater	
tomato	tomato waste	tomato plant waste tomato processing waste
turkey	turkey litter	
turkey	turkey processing wastewater	
tyre	waste tyre rubber	
walnut	walnut shells	
wheat	wheat bran	
wheat	wheat chaff	
wheat	wheat dregs	
wheat	wheat fiber	
wheat	wheat gluten	
wheat	wheat husk	
wheat	wheat residue	
wheat	wheat starch	
wheat	wheat straw	wheat straws
wine	wine vinasse	wine vinasses
wine	winery waste	winery wastes wine wastes
wine	winery wastewater	winery wastewater treatment winery wastewaters winery effluent winery effluents wine processing waste sludge wine distillery wastewater wine distillery wastewaters

Category	Preferred Label	Alternative Labels
wood	wood ash	wood fly ash
wood	wood bark	
wood	wood blocks	
wood	wood char	wood charcoal wood biochar
wood	wood chip	wood chips woodchip woodchips
wood	wood dust	wood powder
wood	wood fiber	wood fibre wood fibres
wood	wood flour	
wood	wood hydrolysate effluent	
wood	wood meal	
wood	wood mill effluent	wood mill effluents
wood	wood pellet	wood pellets
wood	wood pulp	wood pulping
wood	wood sawdust	softwood sawdust
wood	wood shaving	wood shavings
wood	wood tar	
wood	wood vinegar	
wood	wood waste	wood wastes wood and wood wastes woody debris waste wood waste wood biomass wood residue wood residues wood debris
wood	woodwaste leachate	
yeast	spent yeast	

A.4 DBpedia Spotlight Example

The DBpedia Spotlight service provides an online API (Application Programming Interface) where one can send text to a server online and get a response describing a list of entities found in the text and their corresponding Wikipedia articles. In other words, instead of copy/pasting text for thousands of article abstracts into an online web page ¹, we automated the process. The API defines how you can write programming code in order to communicate with this online server and then understand the results which are returned.

Figure A.4 shows the text of a single abstract along with which of the words have been determined to represent a concept related to a particular Wikipedia article. Table A.4 shows for each of the words found, which Wikipedia article was suggested. Note that the results are sorted by the Wikipedia Article. Entries that appear twice in the table were actually found twice in the abstract. To further explain the meaning of the columns in Table A.4, the “surfaceForm” is the exact text match in the abstract, while “Wikipedia Article” is the article that the surfaceForm was matched with. The “support” column relates to the number of inlinks on Wikipedia, which means that we have more confidence about the annotation since we have more info about it via the links. The “similarityScore” is based on the context, so not just string matching, but looking at other words that are nearby in the text, versus other words that are nearby in the Wikipedia article. This is a technique that helps to disambiguate if a reference to “Paris” is referring to the city in Texas or the city in France.

As expected, text that is an exact match with a Wikipedia article is found easily. Scientific names are found as well when a common name is given. The text “black soldier fly² larvae” is linked to the article on “*Hermetia illucens*”, and the text “soldier fly” is linked to “Stratiomyidae”, which is the family of flies that the black soldier fly is in. While in the analysis presented, we do not evaluate co-occurrence of organisms with TAPs, this does show the power of this approach in managing alternative forms of terms.

¹like the one at <http://demo.dbpedia-spotlight.org/>

² http://live.dbpedia.org/page/Hermetia_illucens

Biodiesel has become attractive as an alternative renewable fuel, but its large-scale production has been restricted because of the high cost of feedstock. Therefore, alternative feedstock is urgently needed to enable **biodiesel** production from cheap raw materials. Toward this goal, a co-conversion process using BSFL (**black soldier fly larvae**) and **microbes** (Rid-X) was established to convert **rice** straw and RSW (restaurant solid waste) into the larval grease of black **soldier fly**. In this study, about 43.8 g **biodiesel** was produced from 2000 BSFL grown on 1000 g mixed feed of **rice** straw (30%) and **RSW** (70%) within 10 days. About 65.5% of **cellulose**, 56.3% of **hemicellulose**, 8.8% of the **lignin**, 91.6% of **protein** and 71.6% of **lipid** in the feed were digested and utilized for insect **biomass** accumulation with the aid of Rid-X. The results showed that grease from BSFL fed on **rice** straw and **RSW** was suitable for **biodiesel** and most of the fuel properties were corresponding to the requirements of the standard **EN 14214**. The new alternative method was introduced to produce **biodiesel** from **lignocellulose** abundant materials by insect and **microbes**, partly bypassing the complex pretreatment of **lignocellulose** that needed by other **biofuel** technologies.

Figure A.1: Sample abstract, highlighted text indicates entities with matching Wikipedia articles, as described in Table 1

Wikipedia Article	support	surfaceForm	similarityScore
Biodiesel	1133	Biodiesel	1
Biodiesel	1133	Biodiesel	1
Biofuel	1852	Biomass	0.9994981064
Biofuel	1852	Biofuel	1
Cellulose	1818	Cellulose	0.9999977733
Cellulosic ethanol	235	Lignocellulose	0.9999995039
EN 14214	13	EN 14214	1
Hemicellulose	154	Hemicellulose	1
Hermetia_illucens	10	black soldier fly larvae	1
Lignin	589	Lignin	1
Lipid	2050	Lipid	1
Microorganism	2543	Microbes	1
Protein	38586	Protein	0.6712916614
Rice	10609	Rice	1
Royal Scottish Society of Painters in Watercolour	37	RSW	0.9999999111
Stratiomyidae	119	soldier fly	1

Table 1: Entities extracted using DBpedia Spotlight, with their corresponding Wikipedia articles and extraction scores. The “surfaceForm” is the text highlighted in Figure A.1

However, the table also shows that there are examples which are not as precise as desired. For example, “lignocellulose” is linked to “Cellulosic ethanol” when a link to the article “Lignocellulosic_biomass” would be more appropriate. Additionally, the abbreviation RSW is not associated with restaurant solid waste, but rather an art organization.

A.5 Alternative Metrics for Co-occurrence Analysis

In the article, we chose NPMI as the metric by which we analyze co-occurrences of waste terms and TAPs. As mentioned in the article, this has the advantage of being able to highlight co-occurrences which occur

more frequently than chance, which may not appear frequently in the entire collection of text. To give an overview of how other co-occurrence metrics may influence the results of our analysis, the reader is directed to the spreadsheet available at https://github.com/isdata-org/mapping-the-bioeconomy/raw/master/CoOccurrenceAnalysis/data/Colocation_Scores.xlsx. In addition to showing the metrics already described (co-occurrence count, PMI and NPMI), it also shows the results for the Weighted Pointwise Mutual Information (WPMI) in addition to the Pearson Residual, whose formulas are shown below.

$$wpmi(x; y) = p(x, y) \log \frac{p(x, y)}{p(x)p(y)}$$

Equation 3: Weighted Pointwise Mutual Information (WPMI)

$$pearson(x; y) = \frac{p(x, y) - p(x)p(y)}{p(x)p(y)}$$

Equation 4: Pearson Residual

A comprehensive overview of co-location metrics is given by Pecina (2005) who lists 87 different approaches that include variants of mutual information, tests of statistical independence, and various heuristic approaches.

A.6 Co-occurrence Matrices for Groups of Wastes

The raw data used to create these matrices is available as a spreadsheet at https://github.com/isdata-org/mapping-the-bioeconomy/raw/master/CoOccurrenceAnalysis/data/Colocation_Scores.xlsx, and this includes alternative co-occurrence metrics described in Appendix A.5.

As the entire co-occurrence analysis results are too large to present in a single matrix, we have created a series of matrices composed of collections of categories defined for wastes in Appendix A.3.3. The sections headers below first give a general description related to the collection of wastes, followed by a list of the waste categories included. For example, what we term “Alcohol Production” below relates to wastes in the categories brewery, wine, distillery, malt and yeast.

A.6.1 Alcohol Production - brewery, wine, distillery, malt, yeast

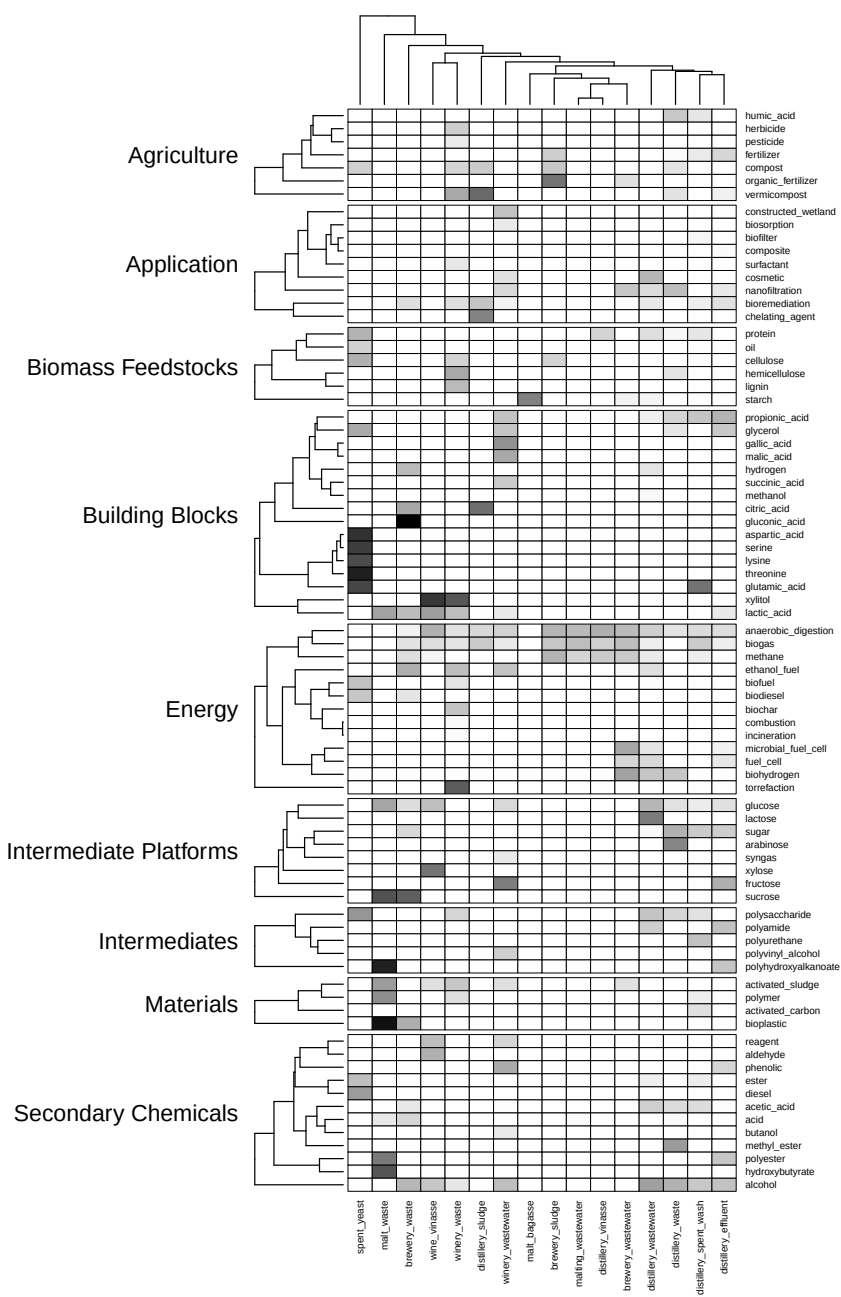


Figure A.2: brewery, wine, distillery, malt, yeast

A.6.2 Aquatic Wastes - aquaculture, fish, crustacean, mussel, oyster, shrimp, seafood, algae, seaweed

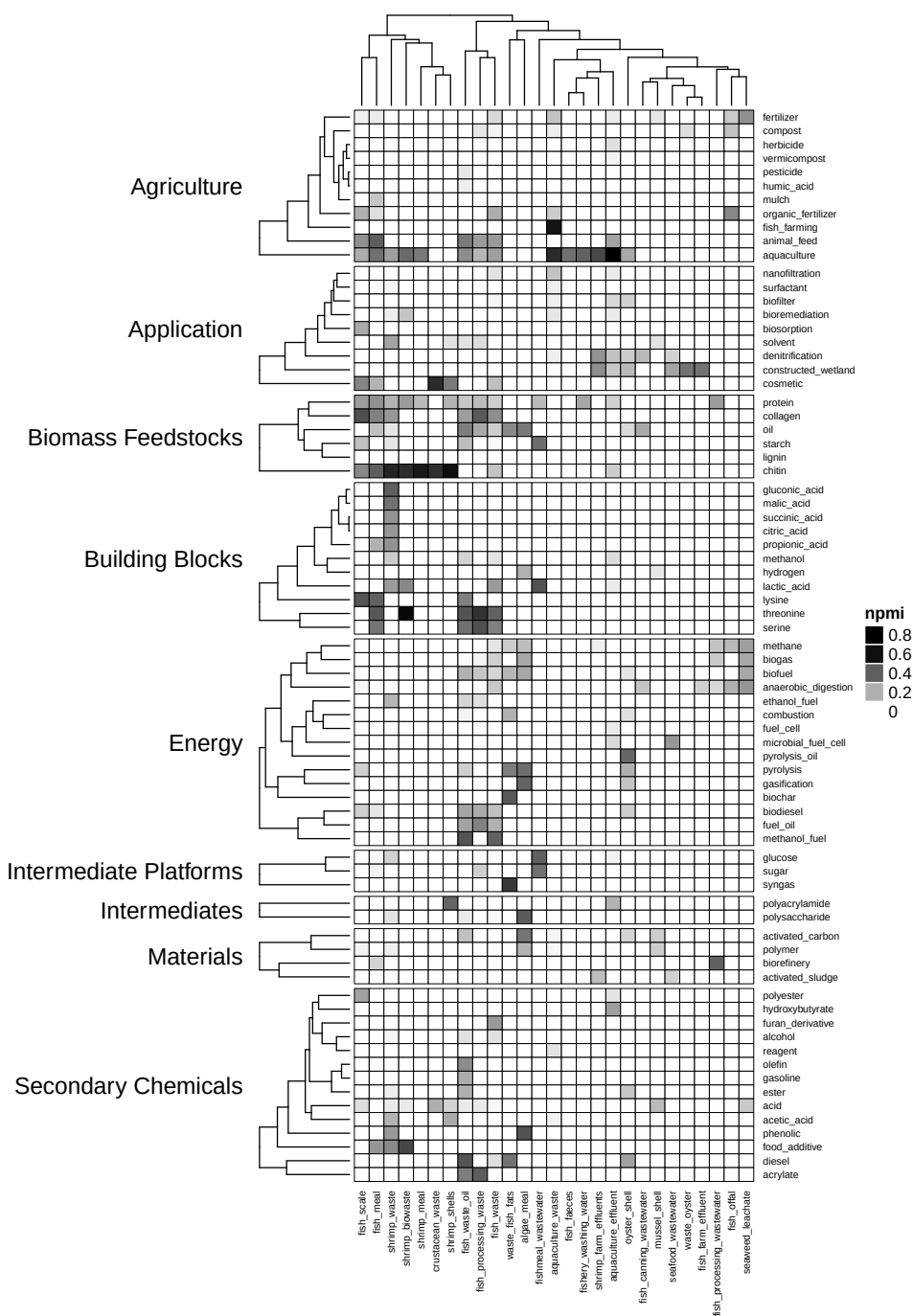


Figure A.3: aquaculture, fish, crustacean, mussel, oyster, shrimp, seafood, algae, seaweed

A.6.3 Birds - poultry, turkey, duck, egg

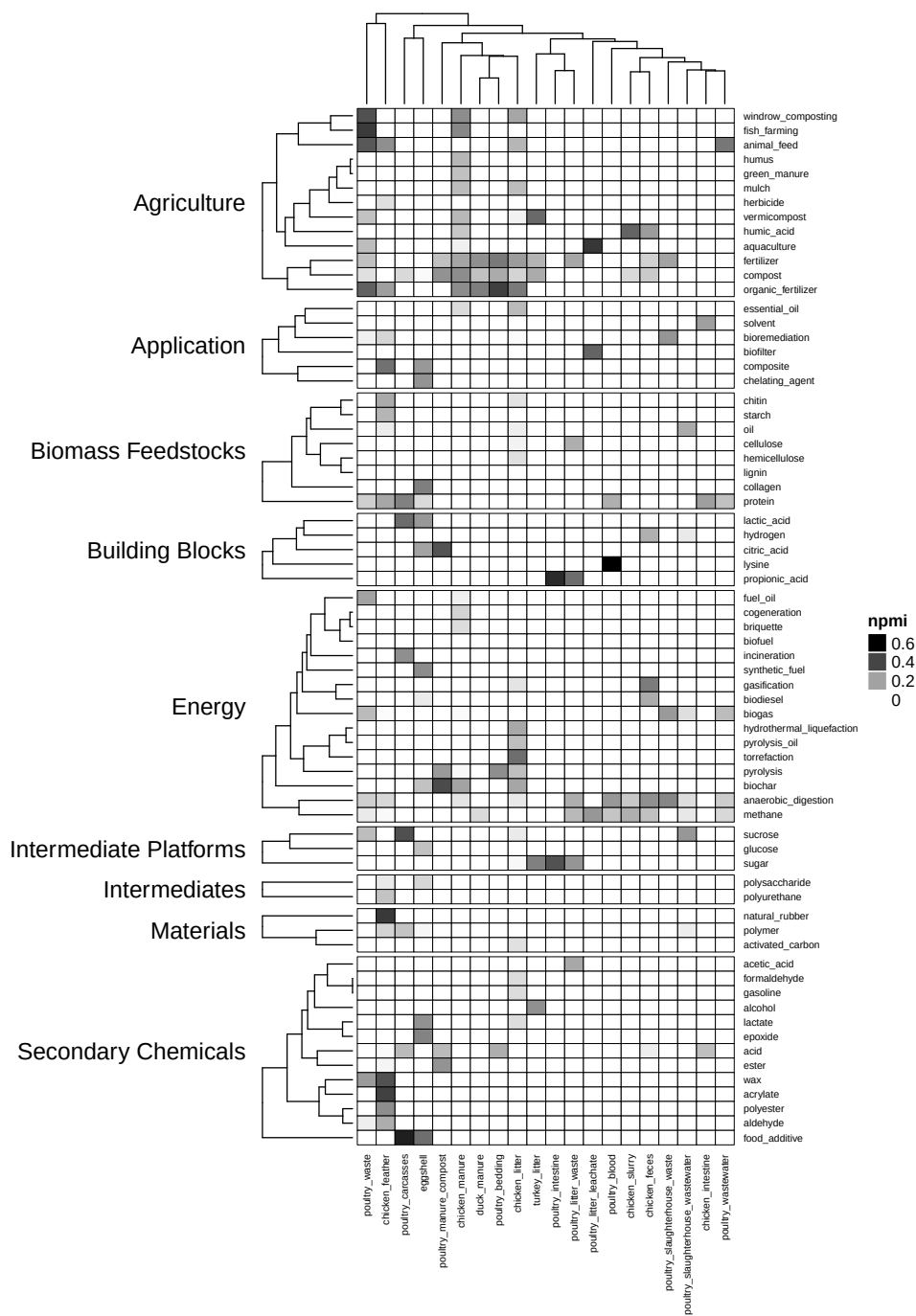


Figure A.4: poultry, turkey, duck, egg

A.6.4 Dairy - cheese, milk, dairy

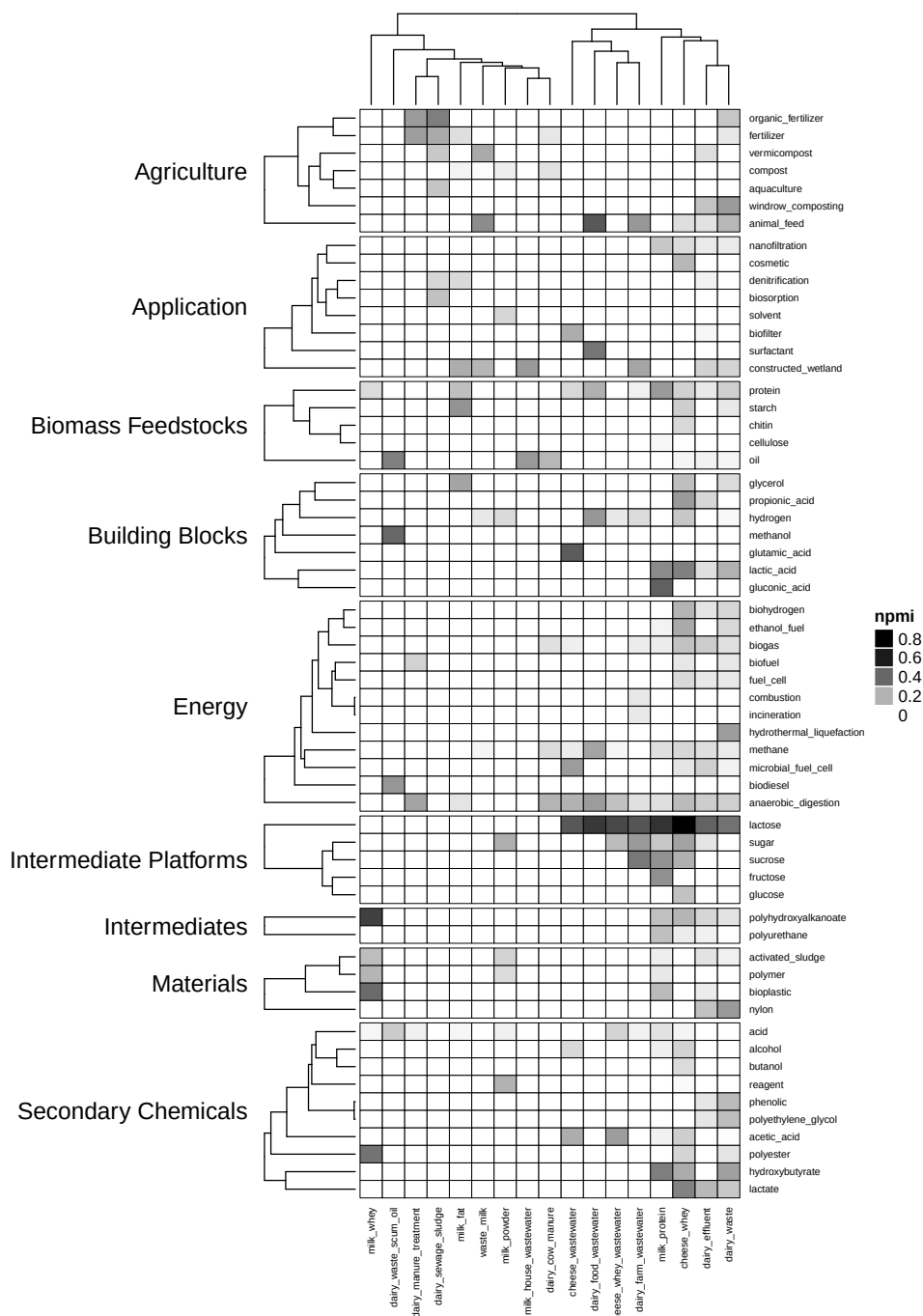


Figure A.5: cheese, milk, dairy

A.6.5 Domestic Waste - household waste, kitchen waste, garden

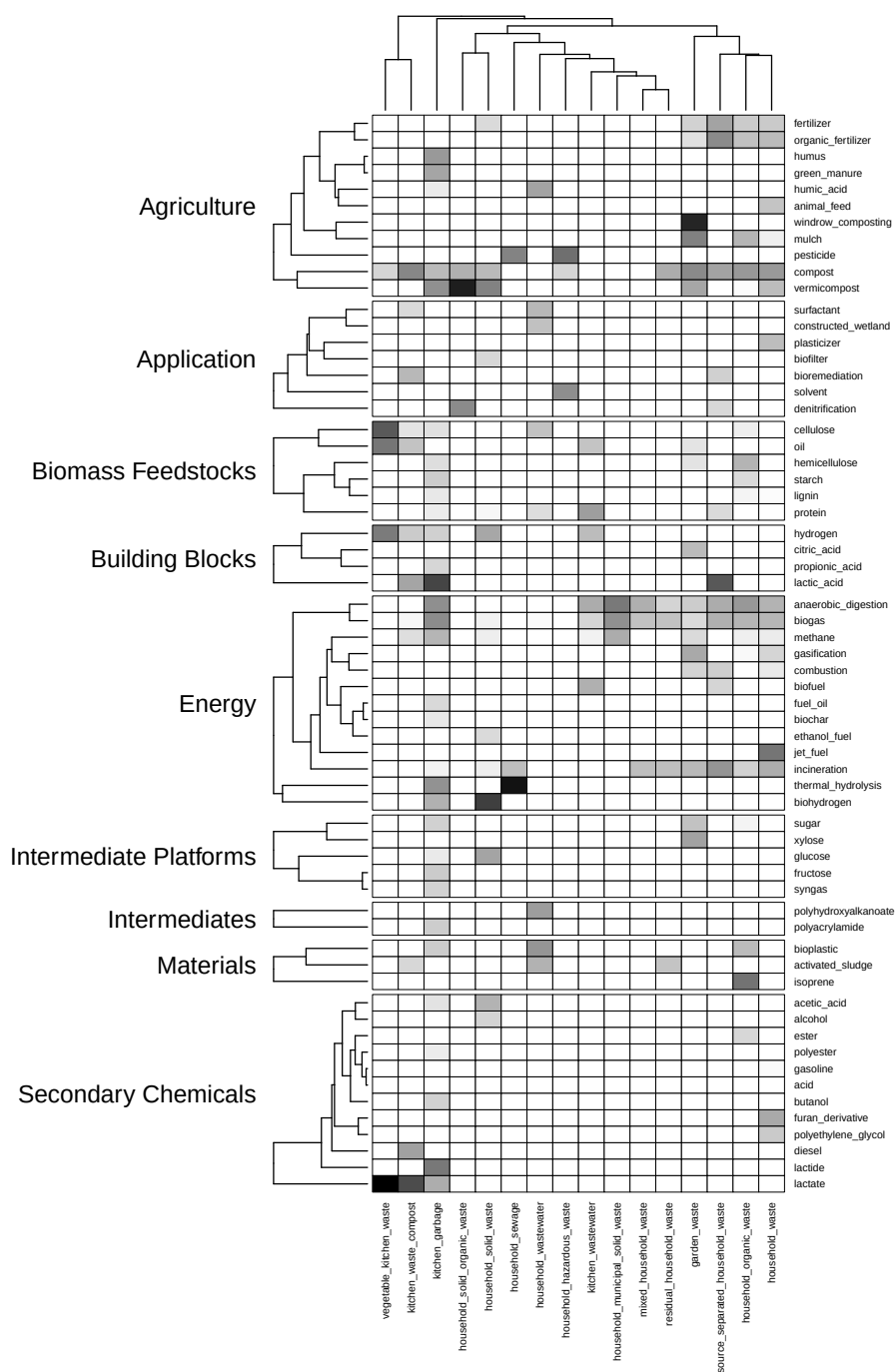


Figure A.6: household waste, kitchen waste, garden

A.6.6 Fruit Trees - peach, olive, mango, orange, pomegranate, apple, apricot, banana

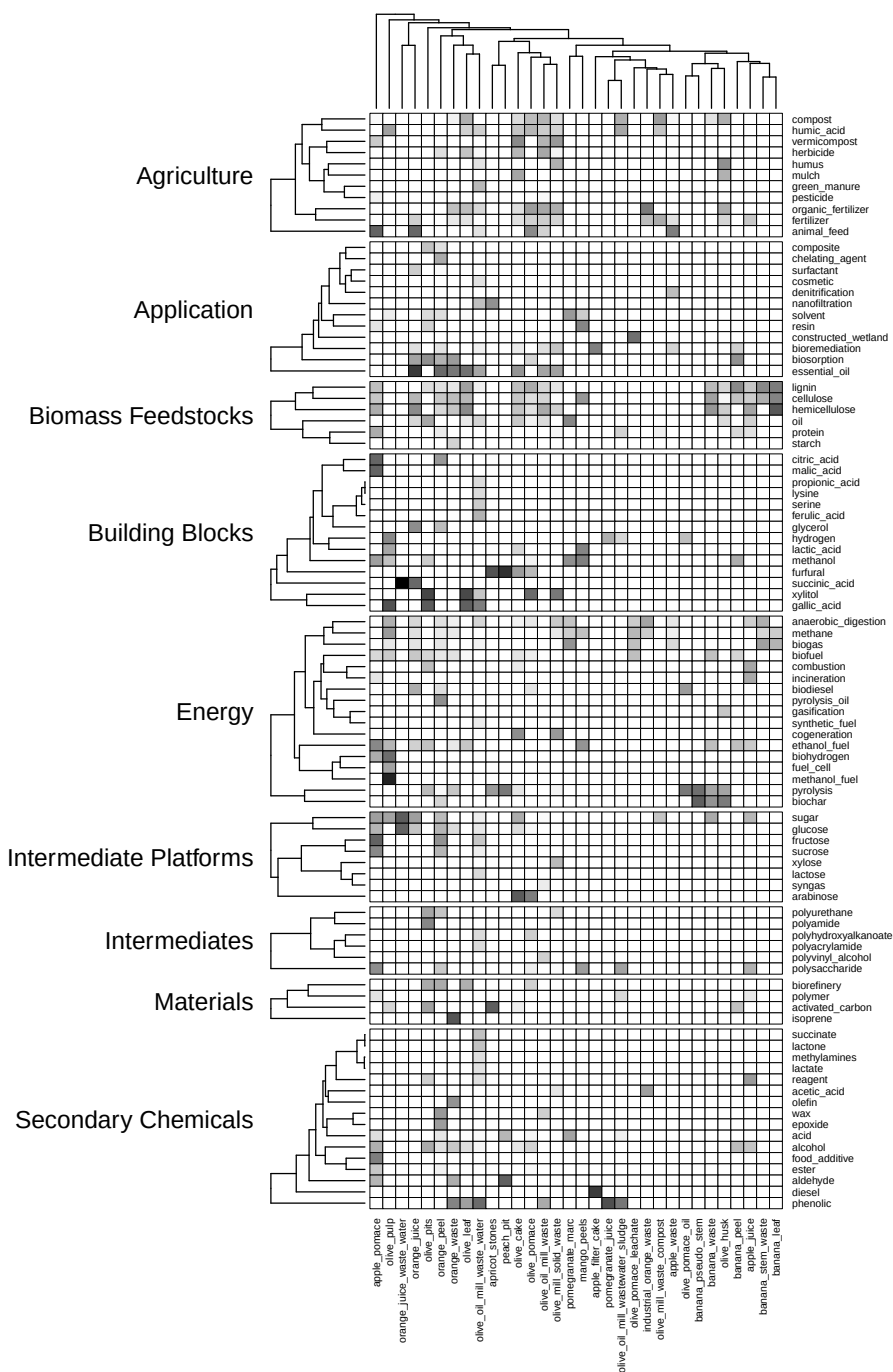


Figure A.7: peach, olive, mango, orange, pomegranate, apple, apricot, banana

A.6.7 General Agricultural Wastes - greenhouse, horticulture, farm

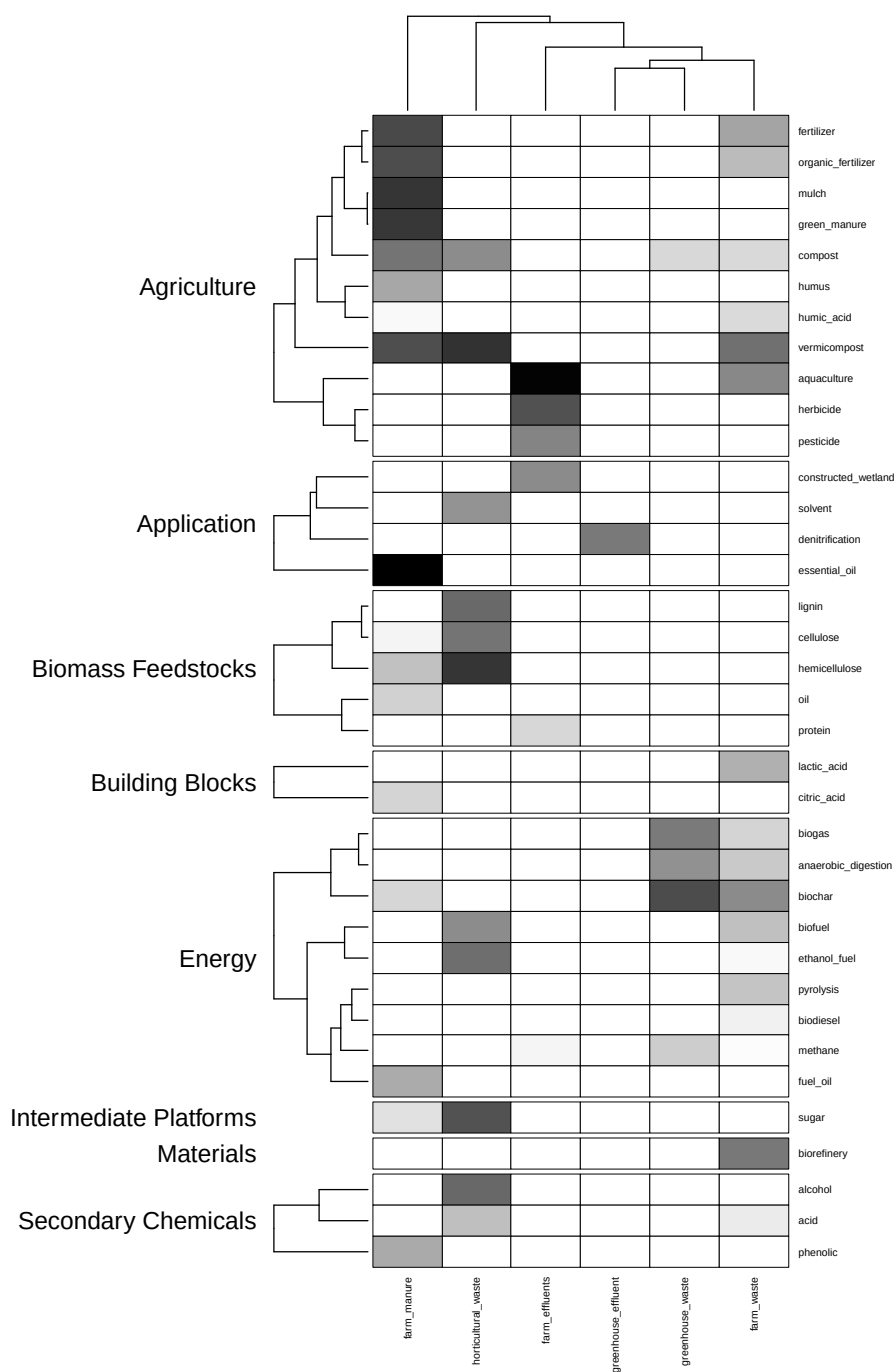


Figure A.8: greenhouse, horticulture, farm

A.6.8 Grains - wheat, sorghum, oat, maize, rice, barley

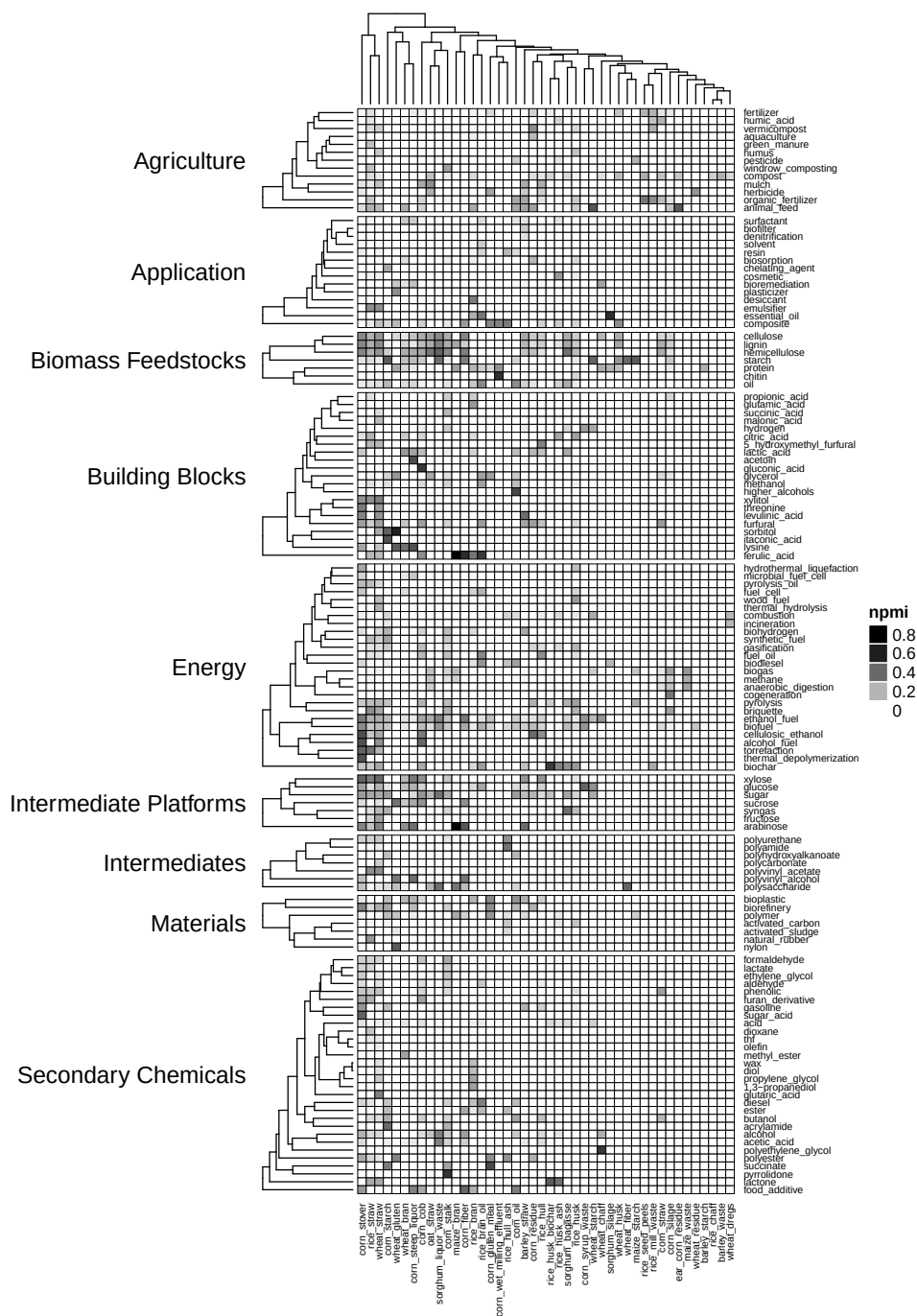


Figure A.9: wheat, sorghum, oat, maize, rice, barley

A.6.9 Grasses - flax, sisal, kenaf, jute, bamboo, sugar cane

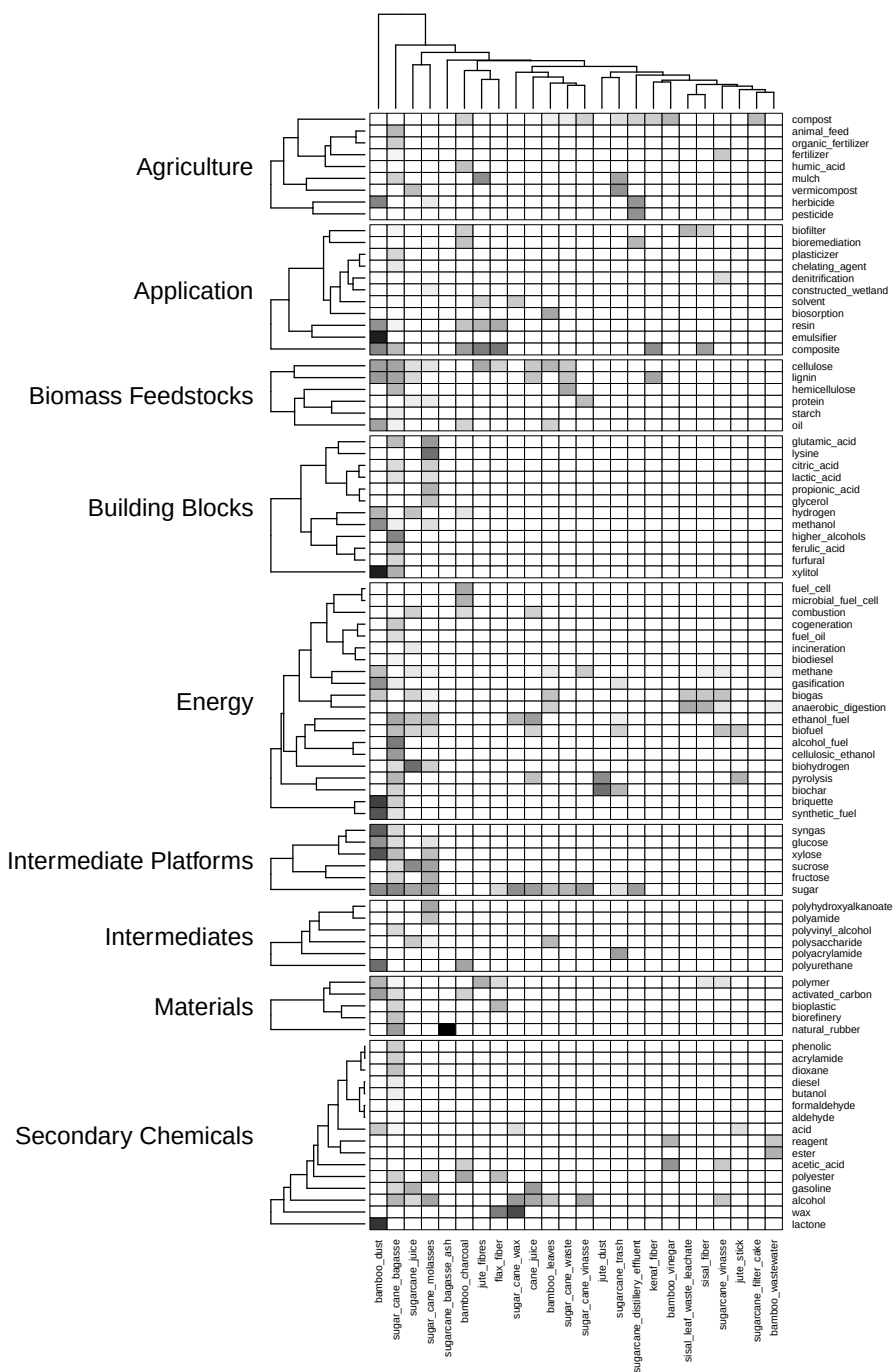


Figure A.10: flax, sisal, kenaf, jute, bamboo, sugar cane

A.6.10 General Industrial Waste - dye, textile, carpet

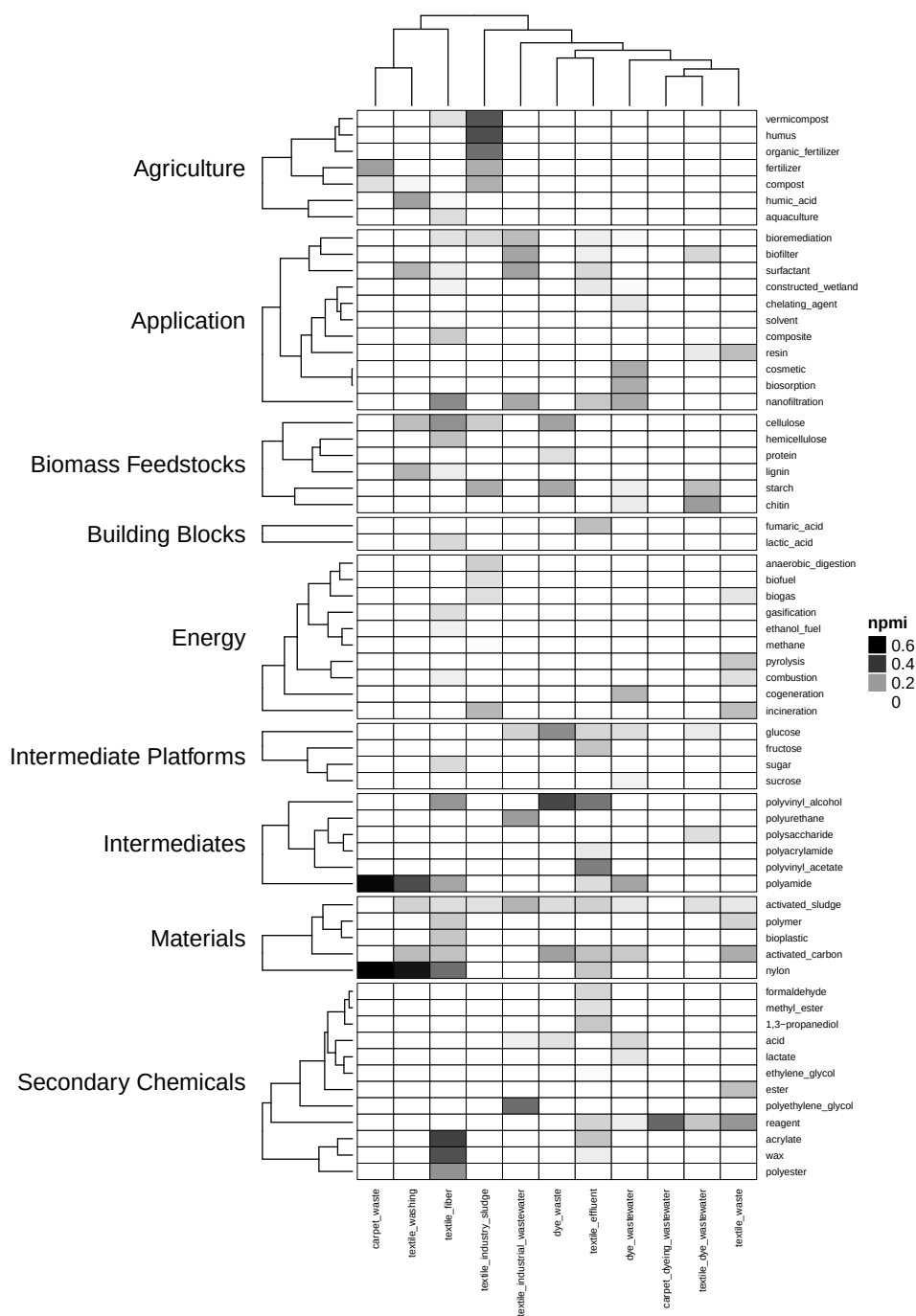


Figure A.11: dye, textile, carpet

A.6.11 Industrial Waste from Animal Materials - tannery, leather, slaughterhouse

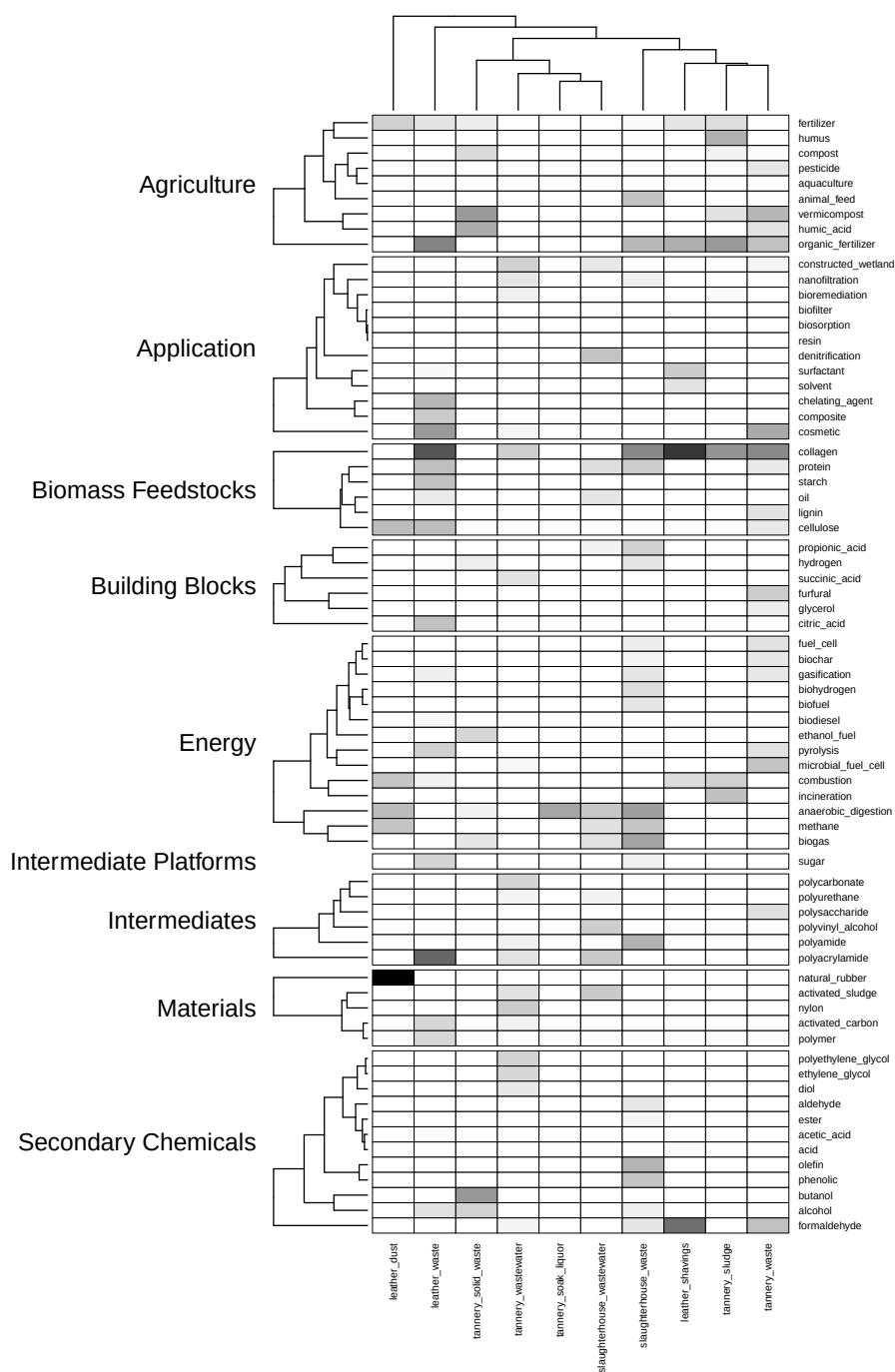


Figure A.12: tannery, leather, slaughterhouse

A.6.12 Mammals - cattle, swine, goat, rabbit, sheep, horse

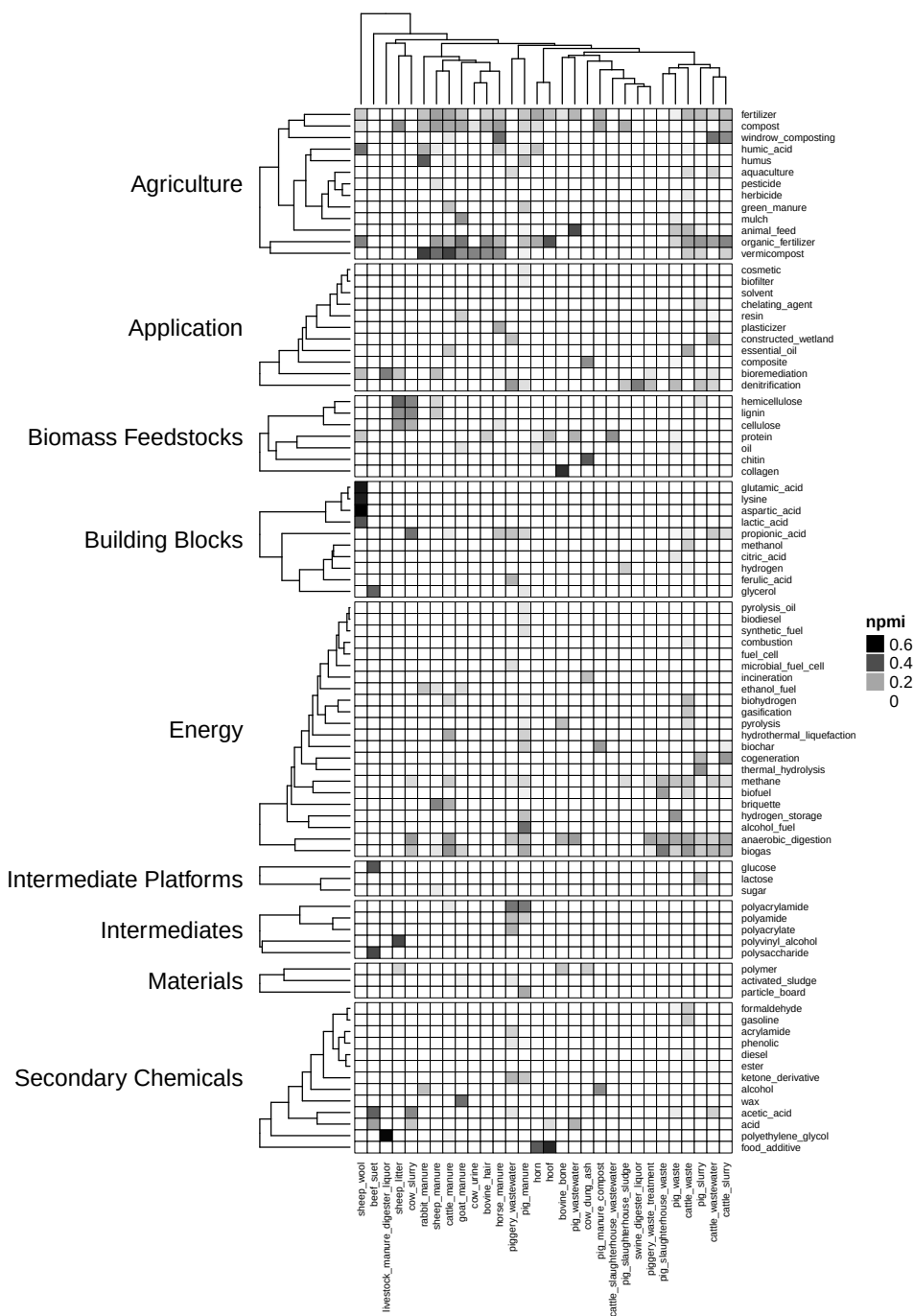


Figure A.13: cattle, swine, goat, rabbit, sheep, horse

A.6.13 Non-food crops - coffee, tea, tobacco, cotton, lucerne, alfalfa, guayule

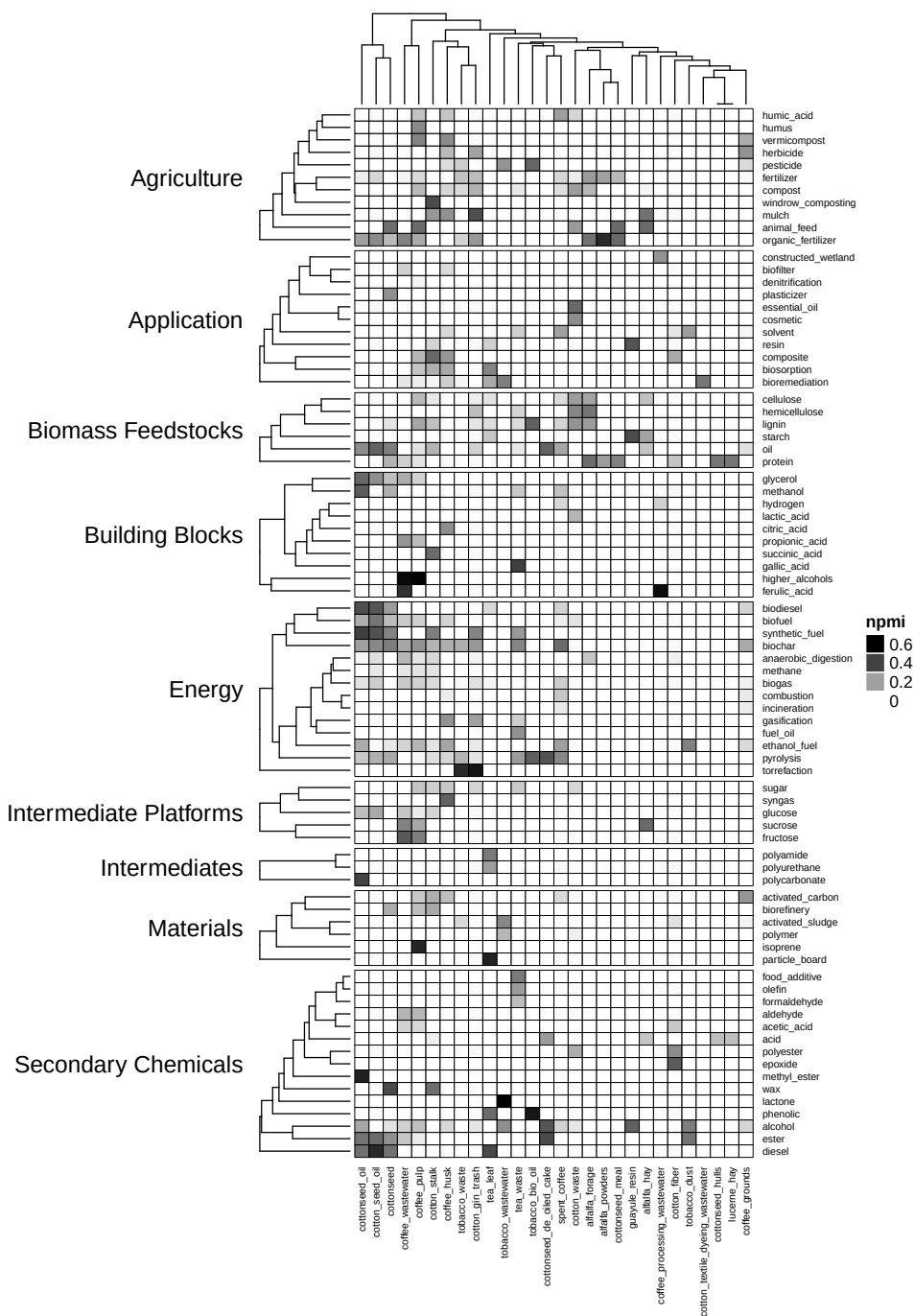


Figure A.14: coffee, tea, tobacco, cotton, lucerne, alfalfa, guayule

A.6.14 Non-food trees - castor, jatropha, neem

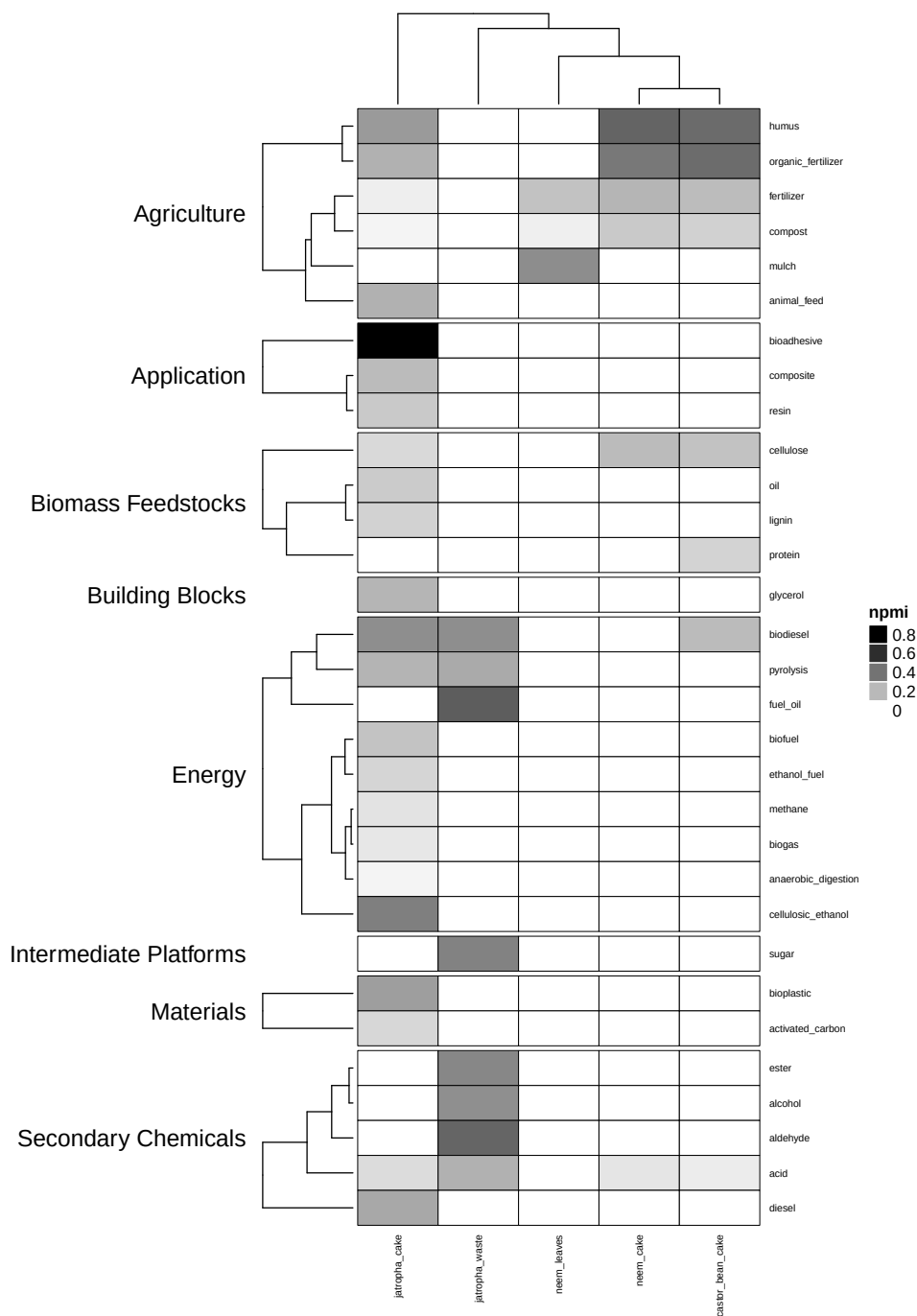


Figure A.15: castor, jatropha, neem

A.6.15 Nut trees - pistachio, hazelnut, almond, walnut

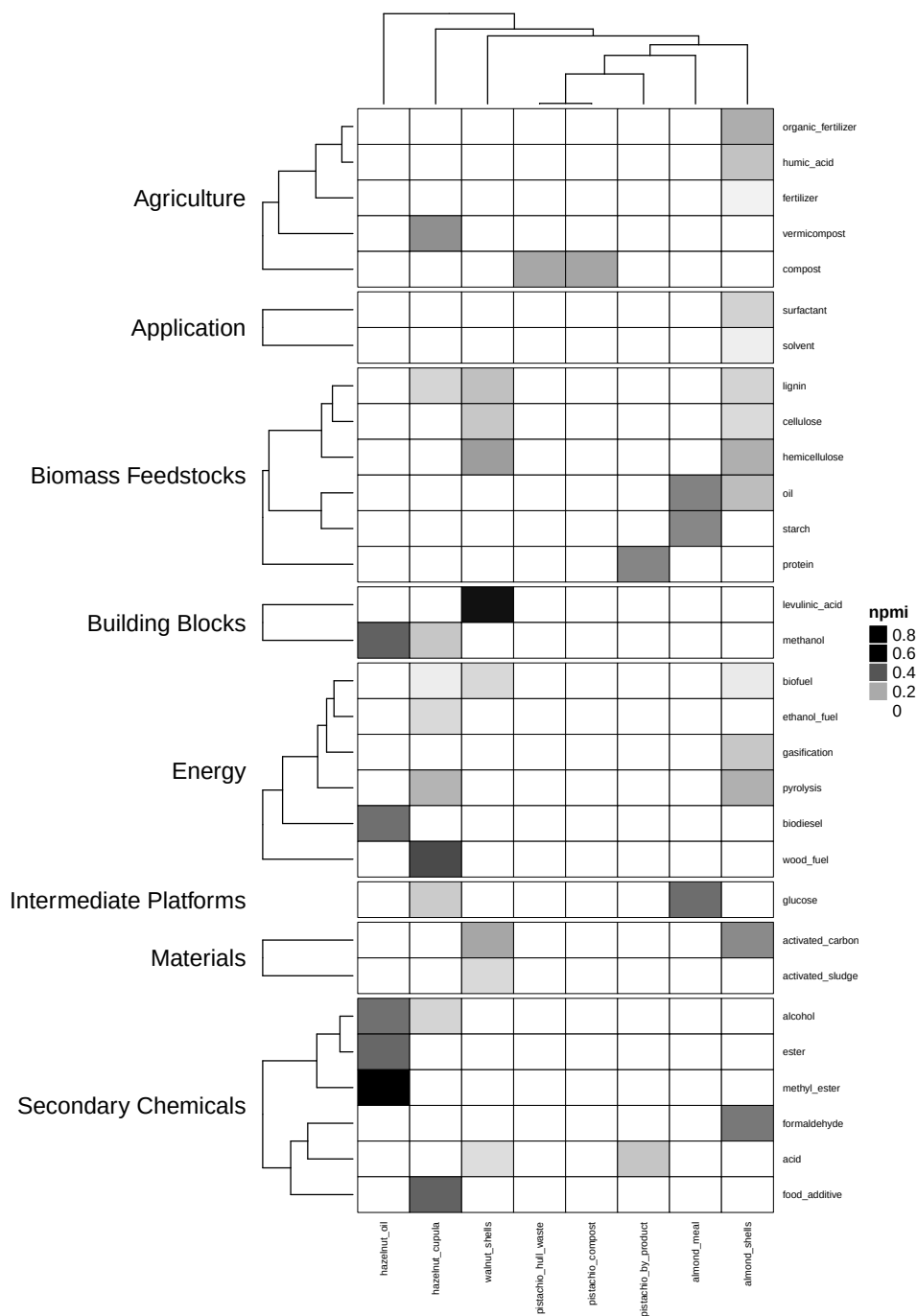


Figure A.16: pistachio, hazelnut, almond, walnut

A.6.16 Oil crops - sunflower, rapeseed, sesame, peanut

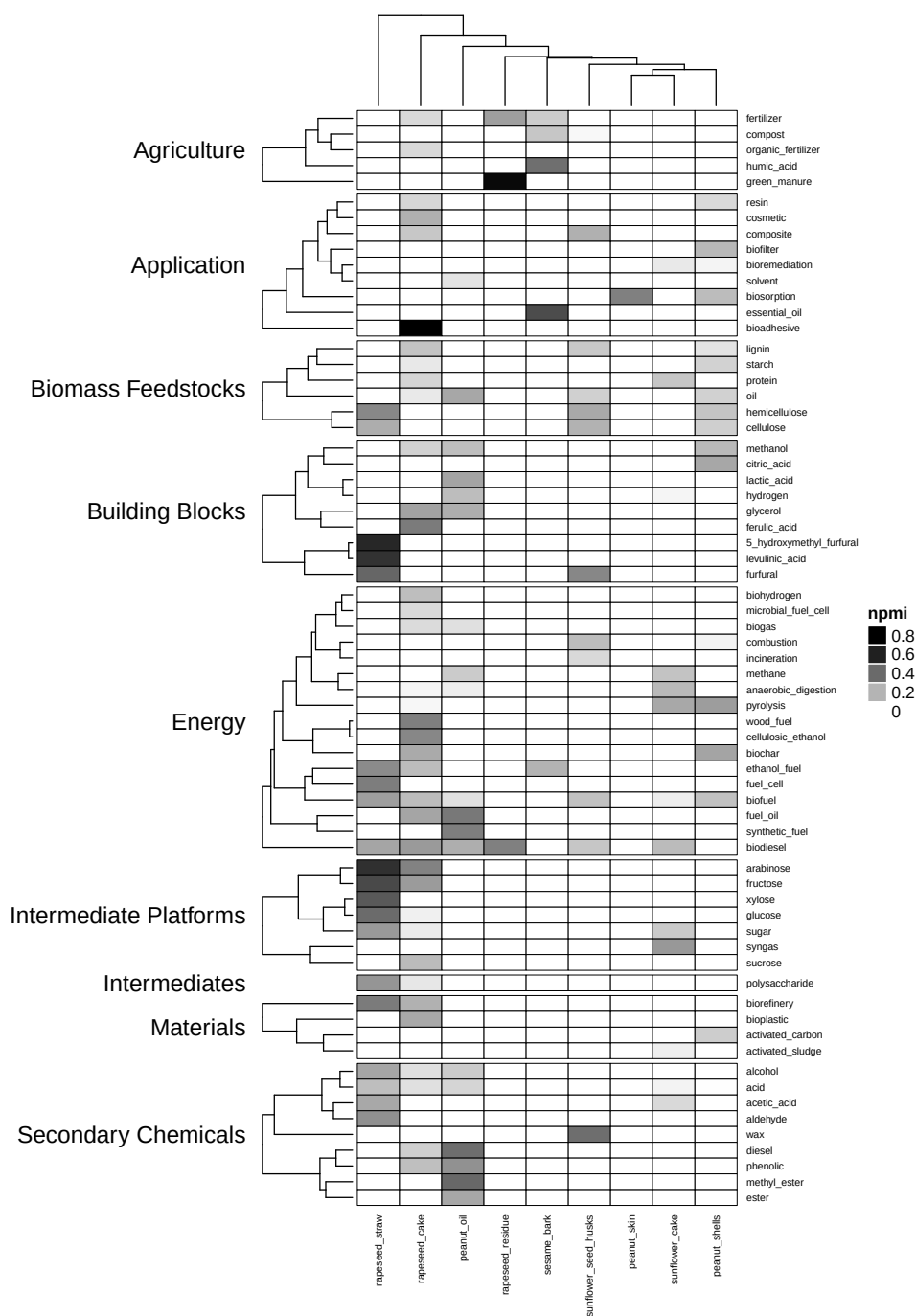


Figure A.17: sunflower, rapeseed, sesame, peanut

A.6.17 Other Industrial Waste - tyre, rubber, sugar

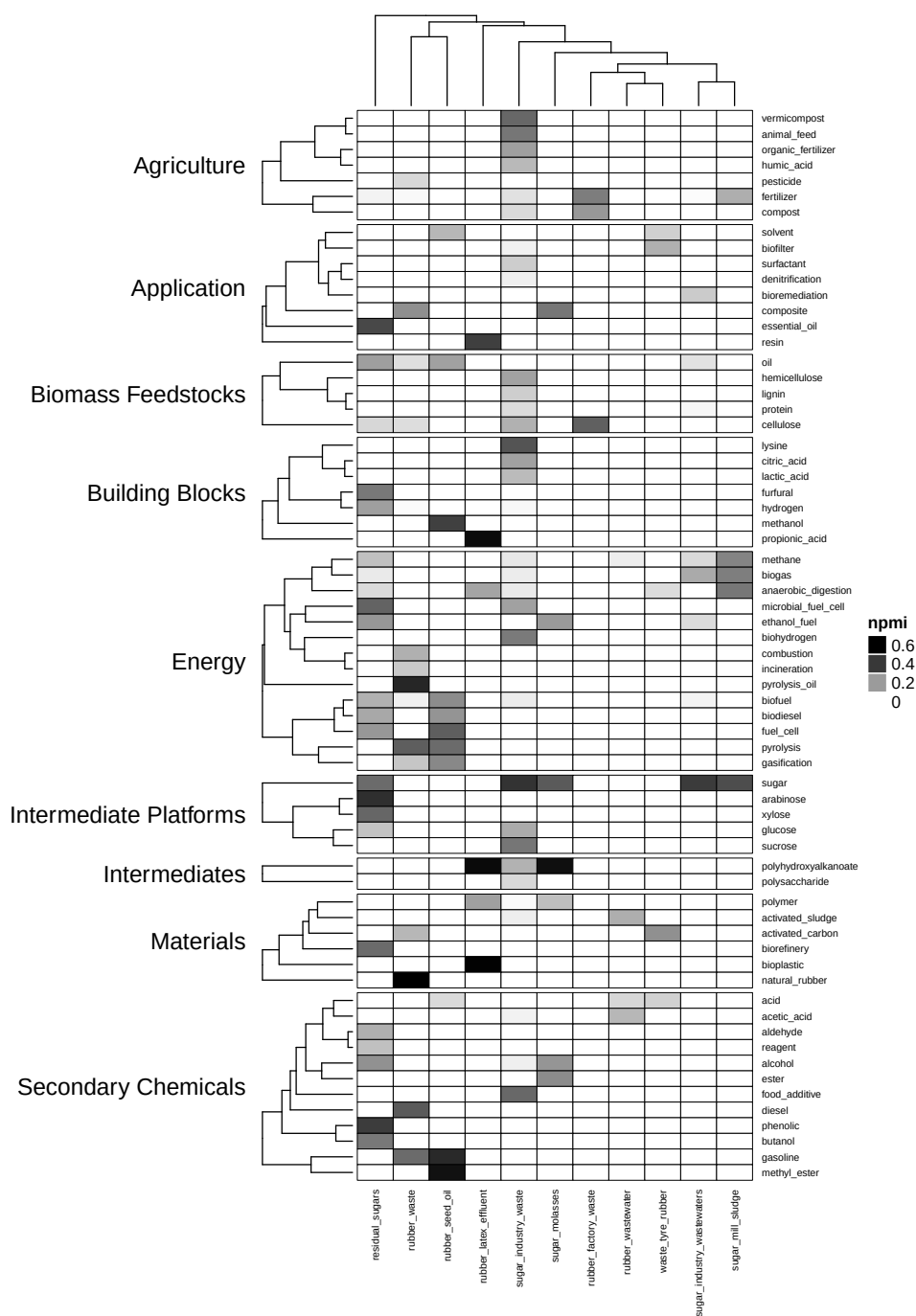


Figure A.18: tyre, rubber, sugar

A.6.18 Palm - palm, coconut, sago, babassu

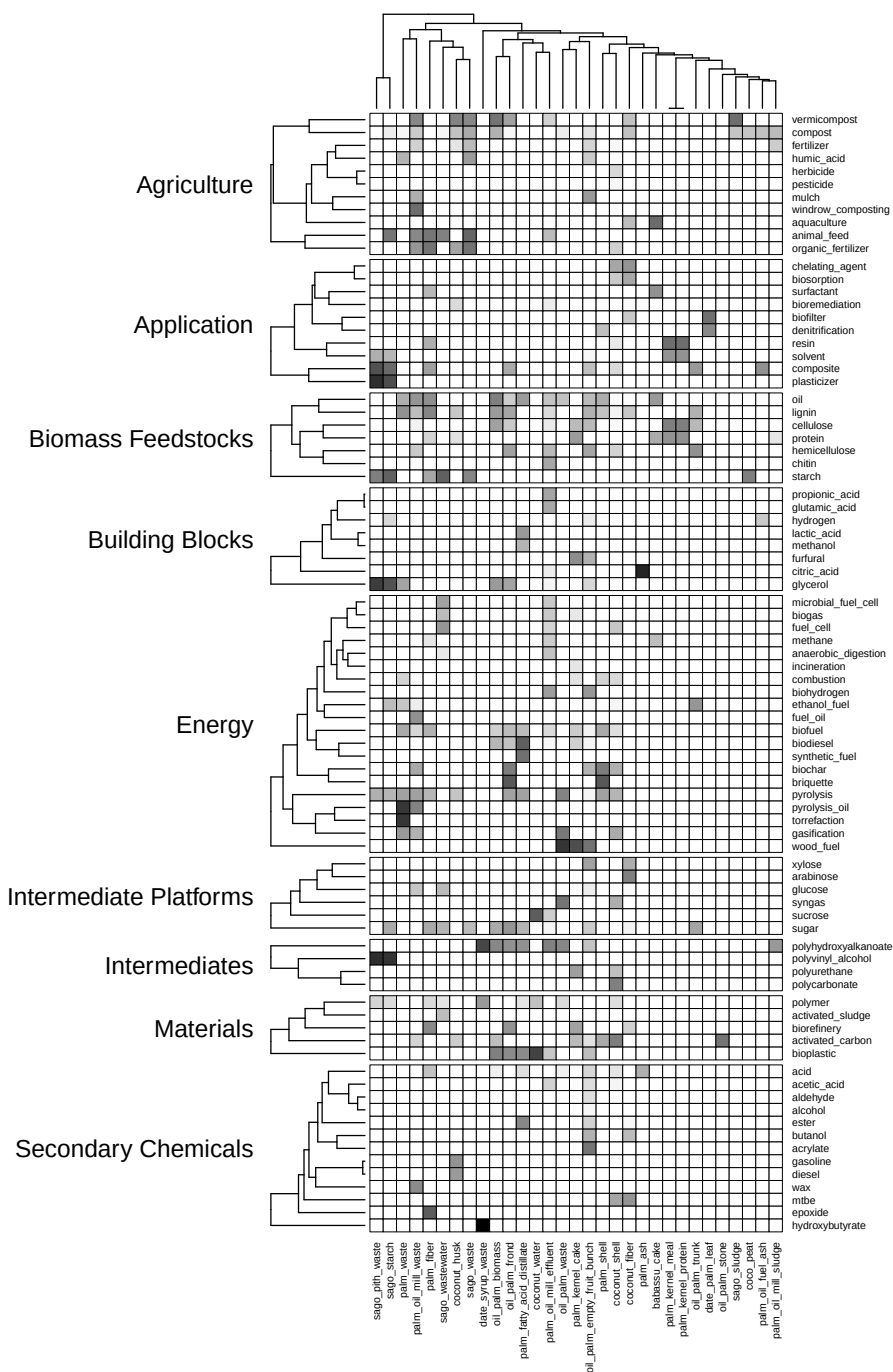


Figure A.19: palm, coconut, sago, babassu

A.6.19 Paper - newspaper, paper, paper mill, kraft

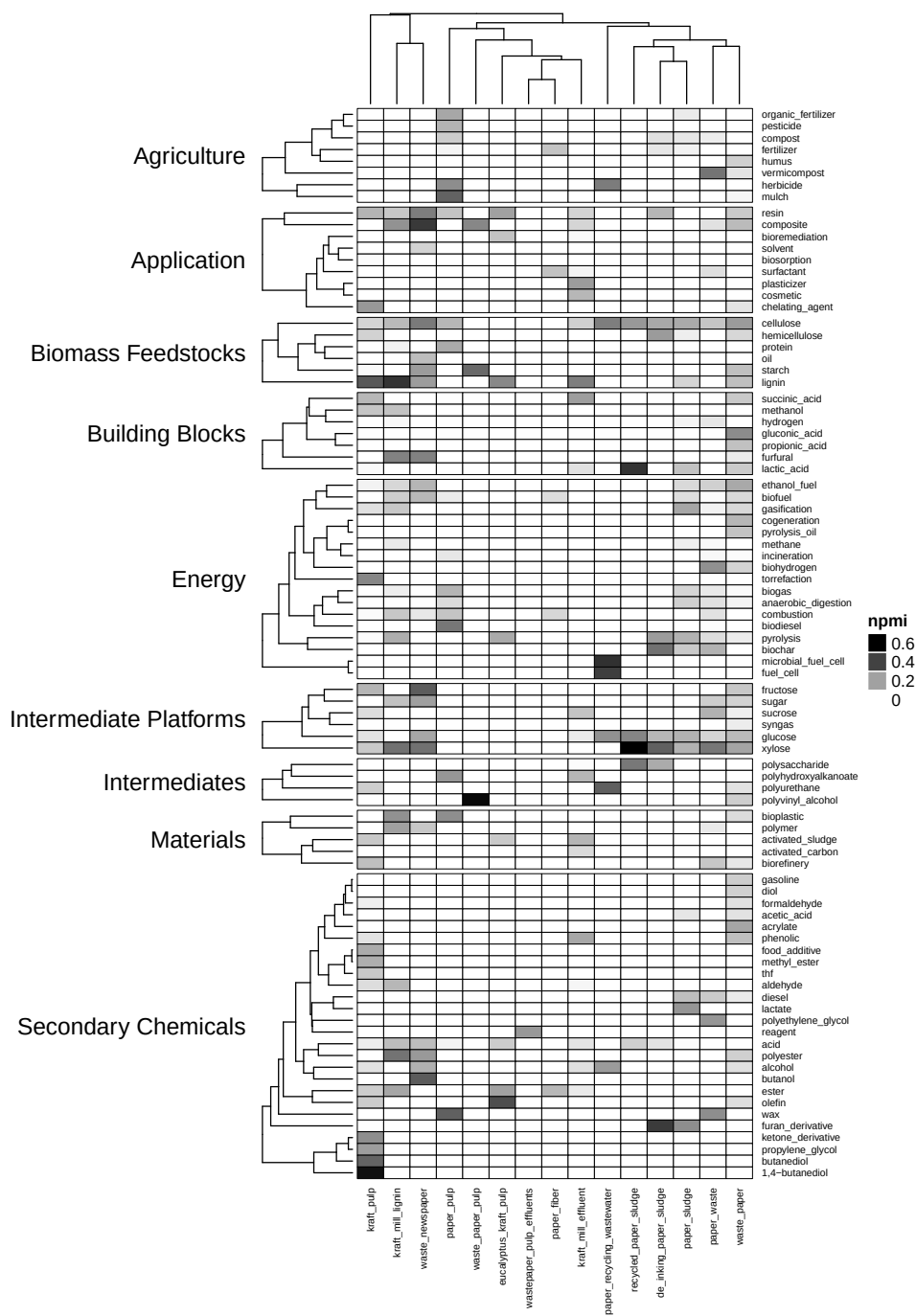


Figure A.20: newspaper, paper, paper mill, kraft

A.6.20 Plant Crops - lettuce, mustard, okra, tomato, broccoli, cabbage, bean, mushroom, pineapple, cranberry, grape, guar

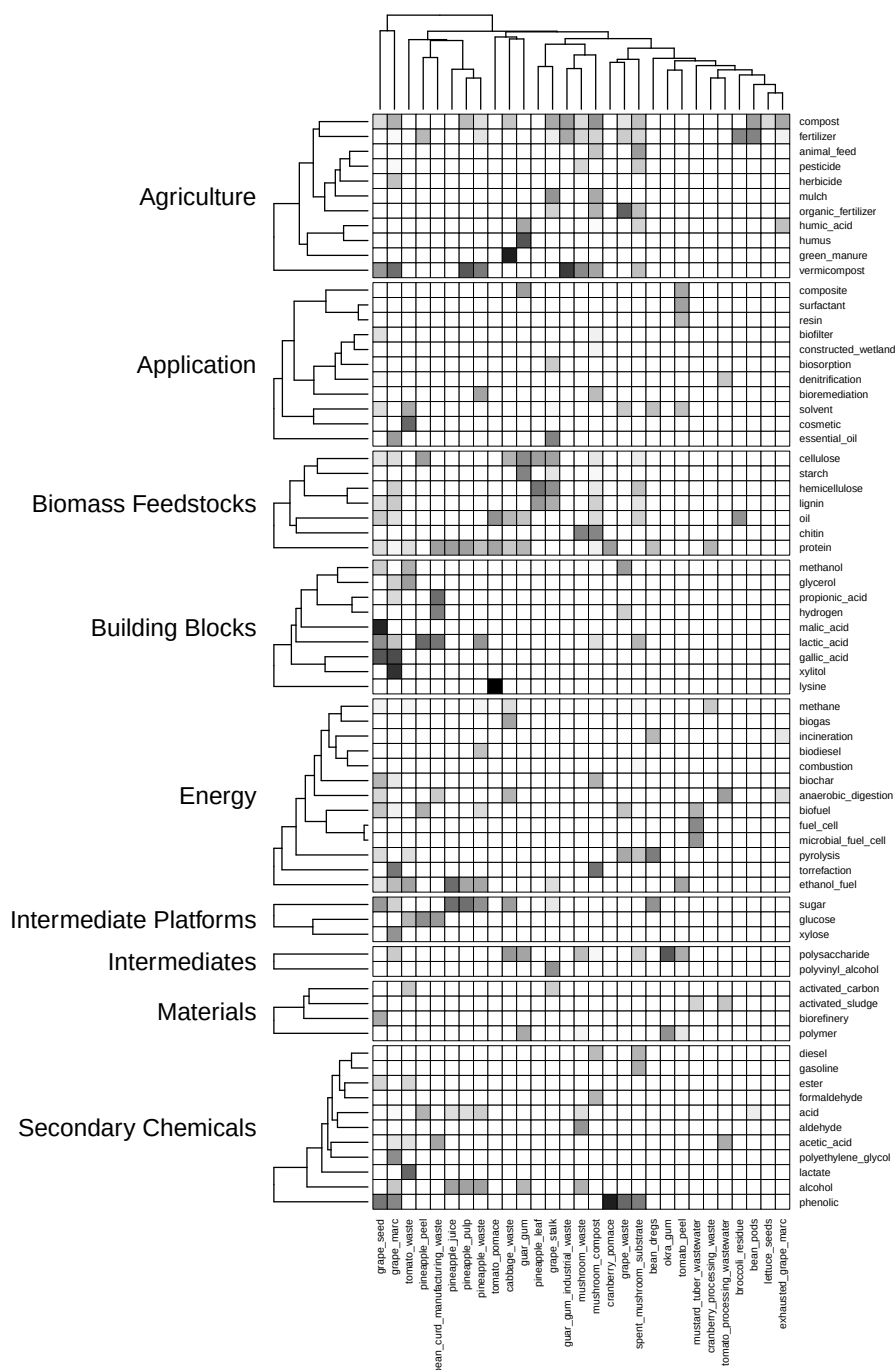


Figure A.21: lettuce, mustard, okra, tomato, broccoli, cabbage, bean, mushroom, pineapple, cranberry, grape, guar

A.6.21 Soy - soy, tofu

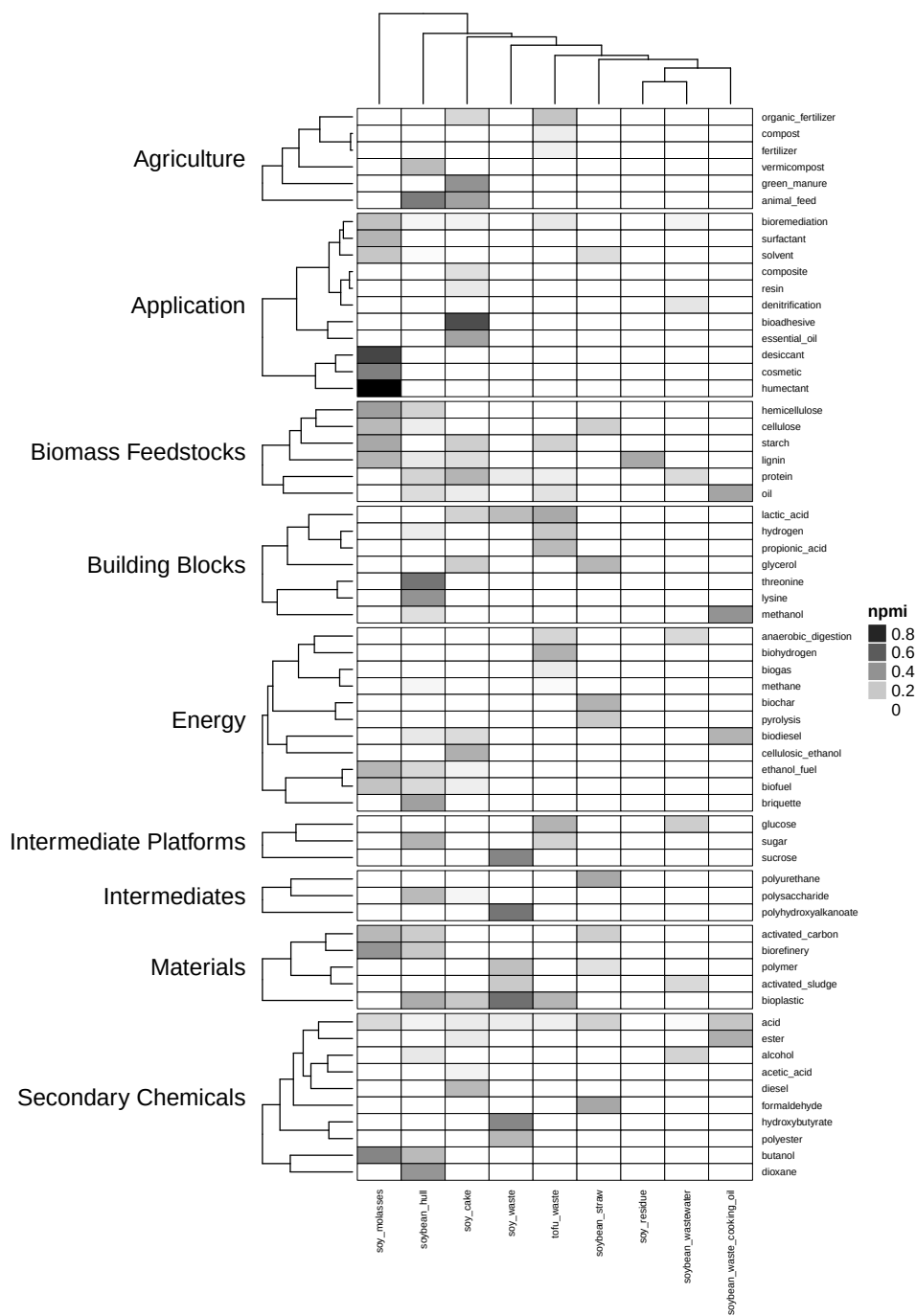


Figure A.22: soy, tofu

A.6.22 Root Crops - onion, potato, cassava, beet, sugar beet

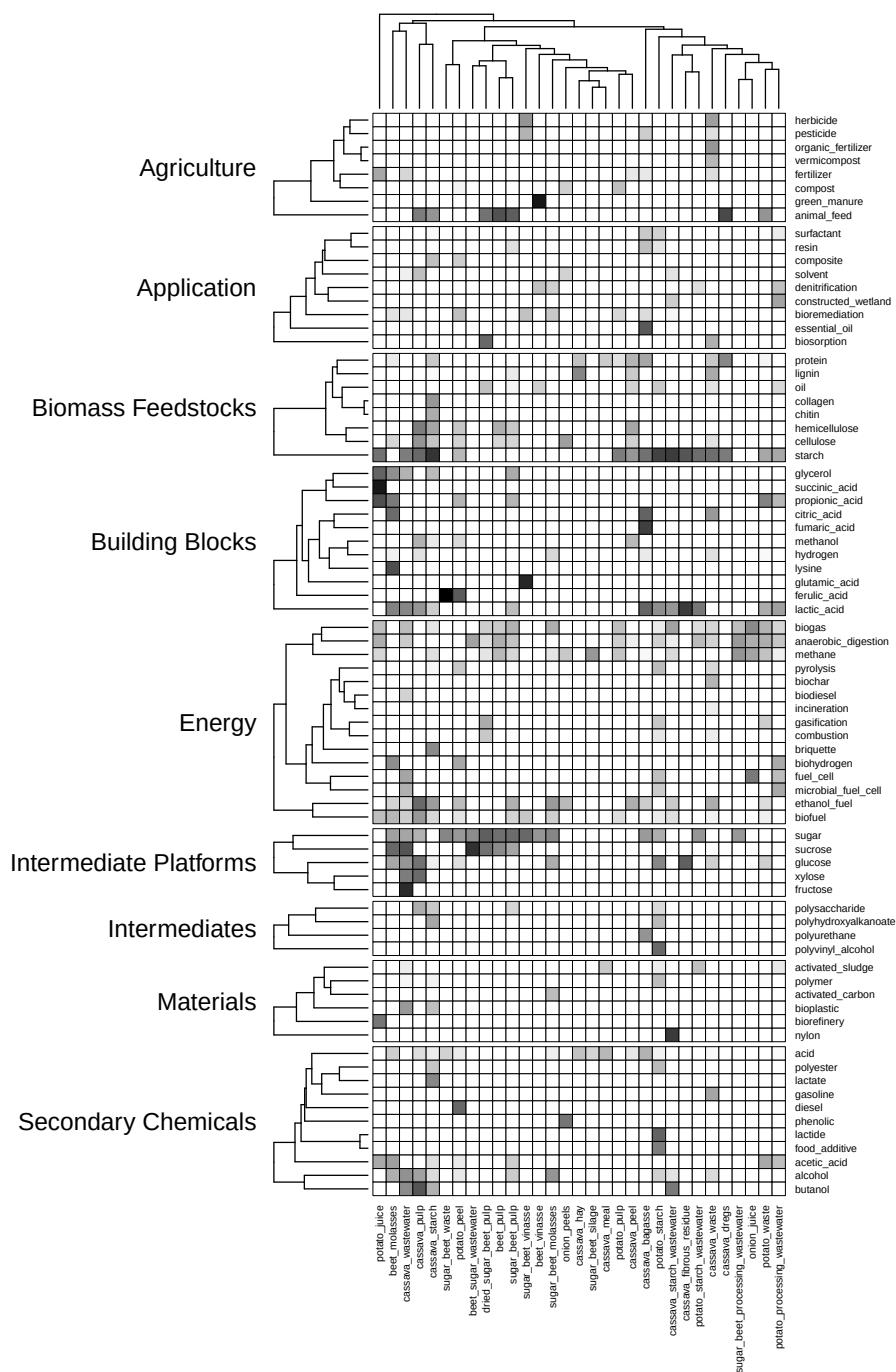


Figure A.23: onion, potato, cassava, beet, sugar beet

A.6.23 Wood - wood, eucalyptus, forest, spruce, pine, poplar, sawmill, oak

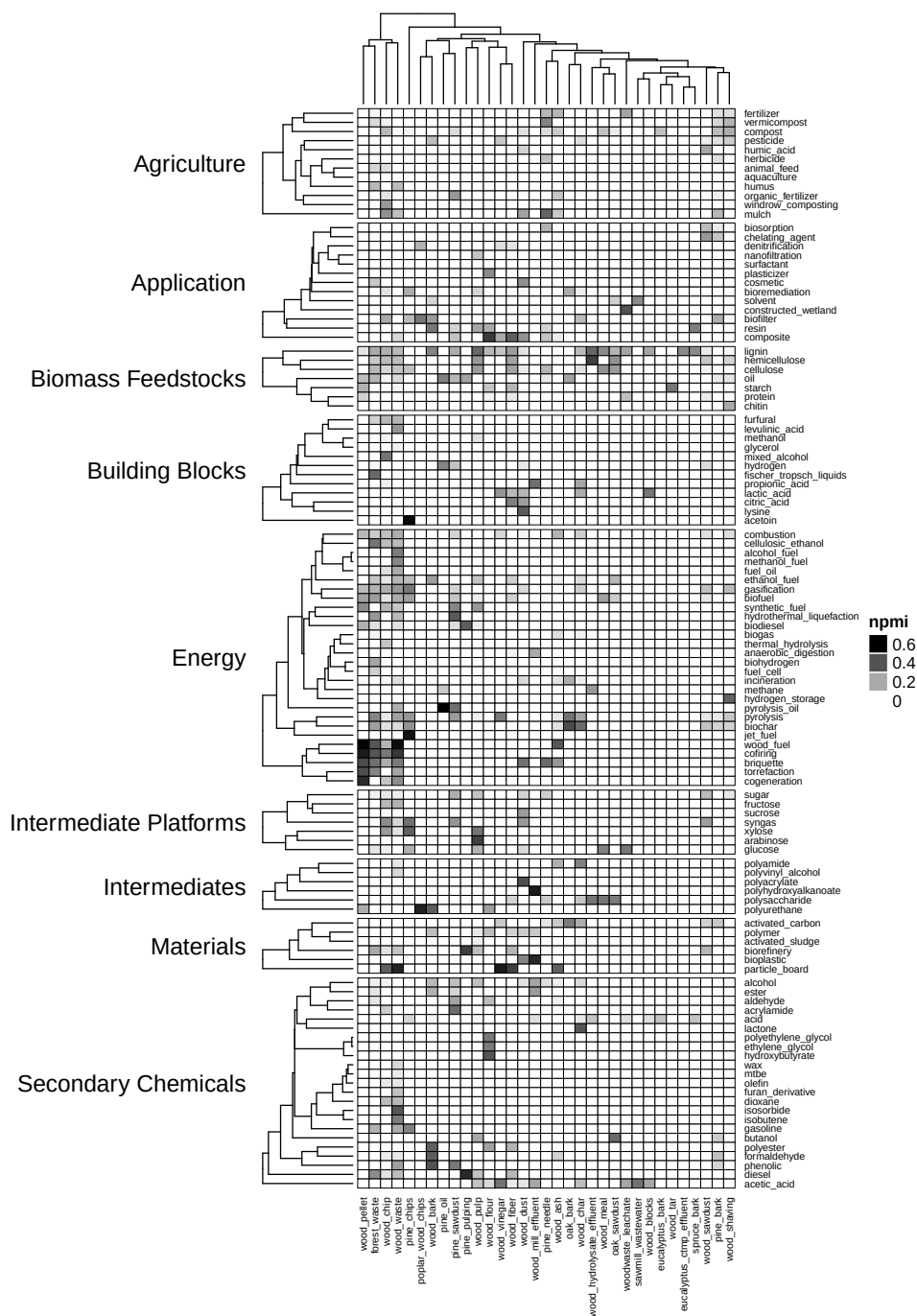


Figure A.24: wood, eucalyptus, forest, spruce, pine, poplar, sawmill, oak