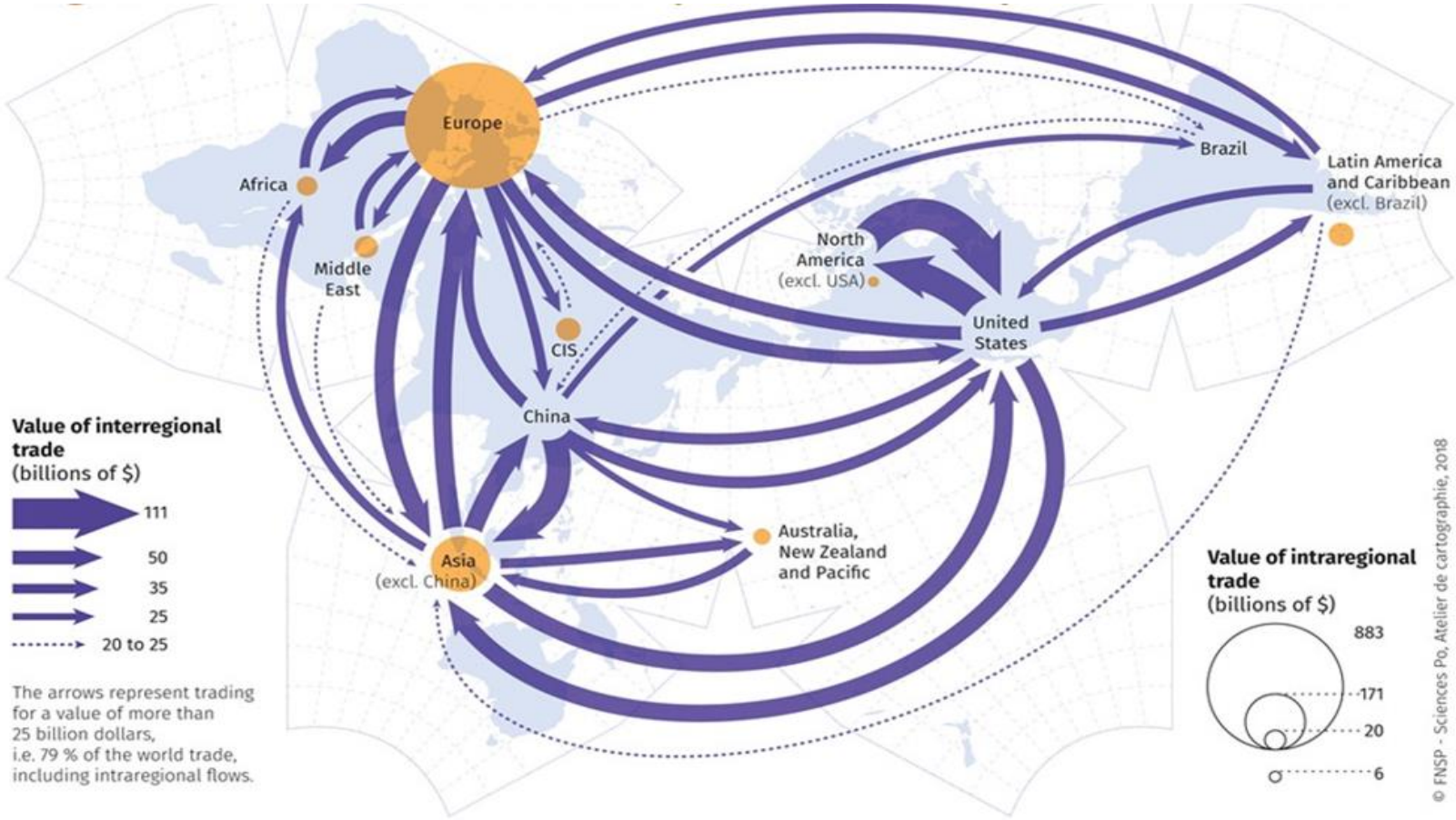
Food Futures: Commercialisation of Gene Edited Crops in Asia and Australia

Gene Editing Policy in APAC – impact on commercialisation

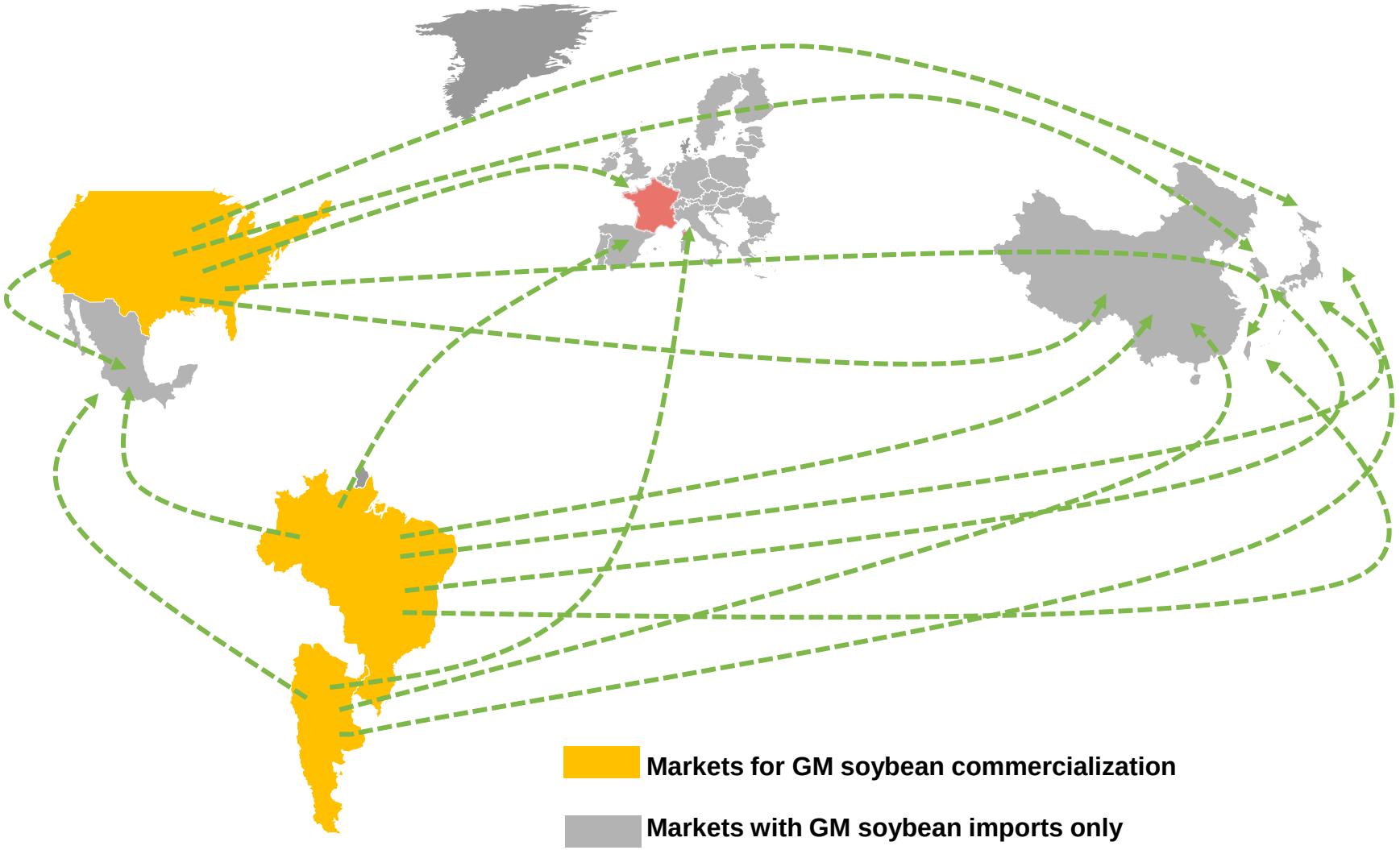
18 November 2021
Kay C. Khoo
Regulatory Affairs Manager, BASF APAC

Current global Agricultural and food exports



BASF
We create chemistry

Global registrations are essential to commercialisation due to grain trade



2016 Soybeans Imports (million Metric Tons)

- China – 83.9
- EU – 15.0
- Mexico – 4.3
- Japan – 3.2
- Taiwan – 2.3
- Korea – 1.4

BASF
We create chemistry

Madai Red Sea Bream from Regional Fish Co., Ltd., together with the Kyoto University and Kinki University

Products Completing USDA "Am I Regulated" Process

Crop	Year	Company/University
High Oleic Canola	2020	Cibus
Reduced pod-shattering Canola	2020	Cibus
Tomato modified form for urban farming	2020	Cold Spring Harbor Labs
Tomato with increased GABA	2020	Sanatech Seed
Canola with altered oil content	2020	Yield10 Bioscience
Brassica juncea with improved flavor	2020	Pairwise
Edited [delayed browning] Avocado	2020	Green Venus LLC
Non-browning [low PPO] Avocado	2020	Simplot
Strawberry with extended fruit set	2020	Simplot
Edited Maize/Soybean/Tomato (3)	2020	Inari Ag.
Potato with modified composition/fertility/yield (6)	2020	Simplot
Altered cuticle Nicotiana	2020	Weizmann Instit. Of Science
Improved quality Barley	2020	Oregon State Univ.
High oleic Soybean	2020	ToolGen
Improved flavor Pea	2020	Benson Hill
High oleic/low linolenic Soybean	2020	Calyxt
Rice with herbicide resistance	2020	Cibus
Flax with herbicide resistance	2020	Cibus
Petunia with modified color	2020	ToolGen
SCN resistant Soybean (2)	2020	Evogene
Edited tomato lacking acyl sugar	2020	Michigan State Univ.
Citrus tolerant to Citrus Canker	2020	Soilcea

Crop	Year	Company/University
Soybean modified composition	2019	Univ. of Minnesota
Edited [non-browning] Lettuce	2019	Intrexon
Altered product quality Camelina	2018	Yield10 Bioscience
Modified oil compo. field pennycress (*T. arvense*) (3+2)	2018- 2020	Illinois State University / CoverCress
"Stem-less" Tomato	2018/ 2020	University of Florida
Increased yield Maize	2018	Benson Hill Biosystems
High fiber Wheat I	2018	Calyxt
Northern Leaf Blight (NLB) Resist. Corn	2018	DuPont Pioneer (Corteva)
Drought/Salt tolerant Soybean	2017	USDA-ARS
Low lignin Knock out Alfalfa	2017	Calyxt
Extra-oil producing gene-edited Camelina	2017/ 2020	Yield10 Bioscience
Setaria viridis (foxtail) w. delayed flowering	2017	Danforth Plant Sci. Center
Non-browning Potato	2016	Simplot
Non-browning Potato	2016	Calyxt
Waxy Corn (high amylopectin)	2016	DuPont Pioneer (Corteva)
Wheat with powdery mildew resistance	2015	Calyxt
Non-browning mushroom	2015	Penn State
Corn with elevated leaf / stalk starch accumulation	2014	Agrivida
Rice resistant to bacterial blight	2014	Iowa State University
Soybean with elevated oleic acid levels (2)	2015	Calyxt
Potato with improved cold storage	2014	Calyxt

As of 25 Aug. 2020

m: https://www.aphis.usda.gov/aphis/ourfocus/biotechnology/am-i-regulated

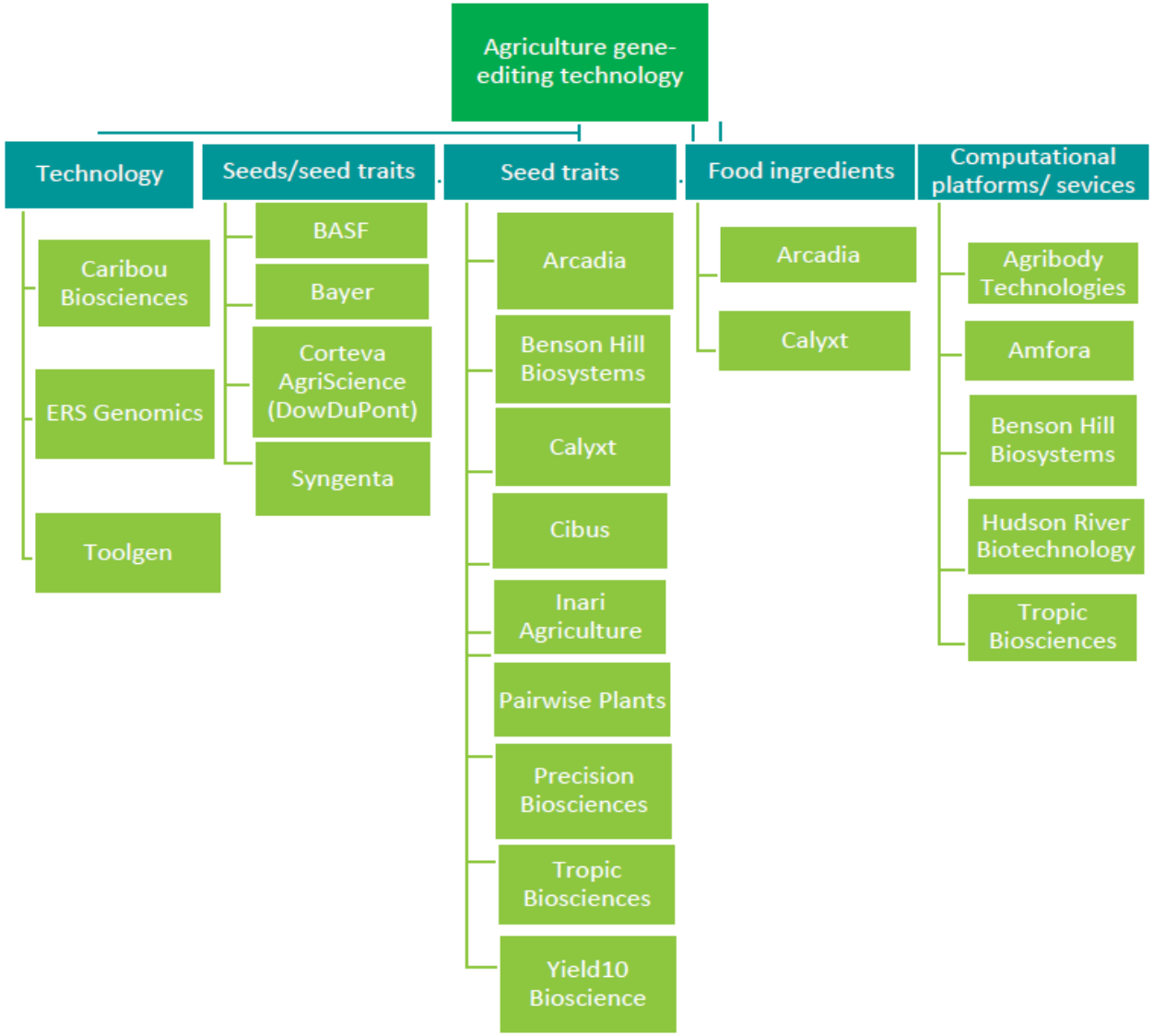
February 26, 2019

First Commercial Sale of Calyxt High Oleic Soybean Oil on the U.S. Market

Calyxt successfully markets Calyno™ High Oleic Soybean Oil as a premium, high-quality food ingredient

BASF
We create chemistry

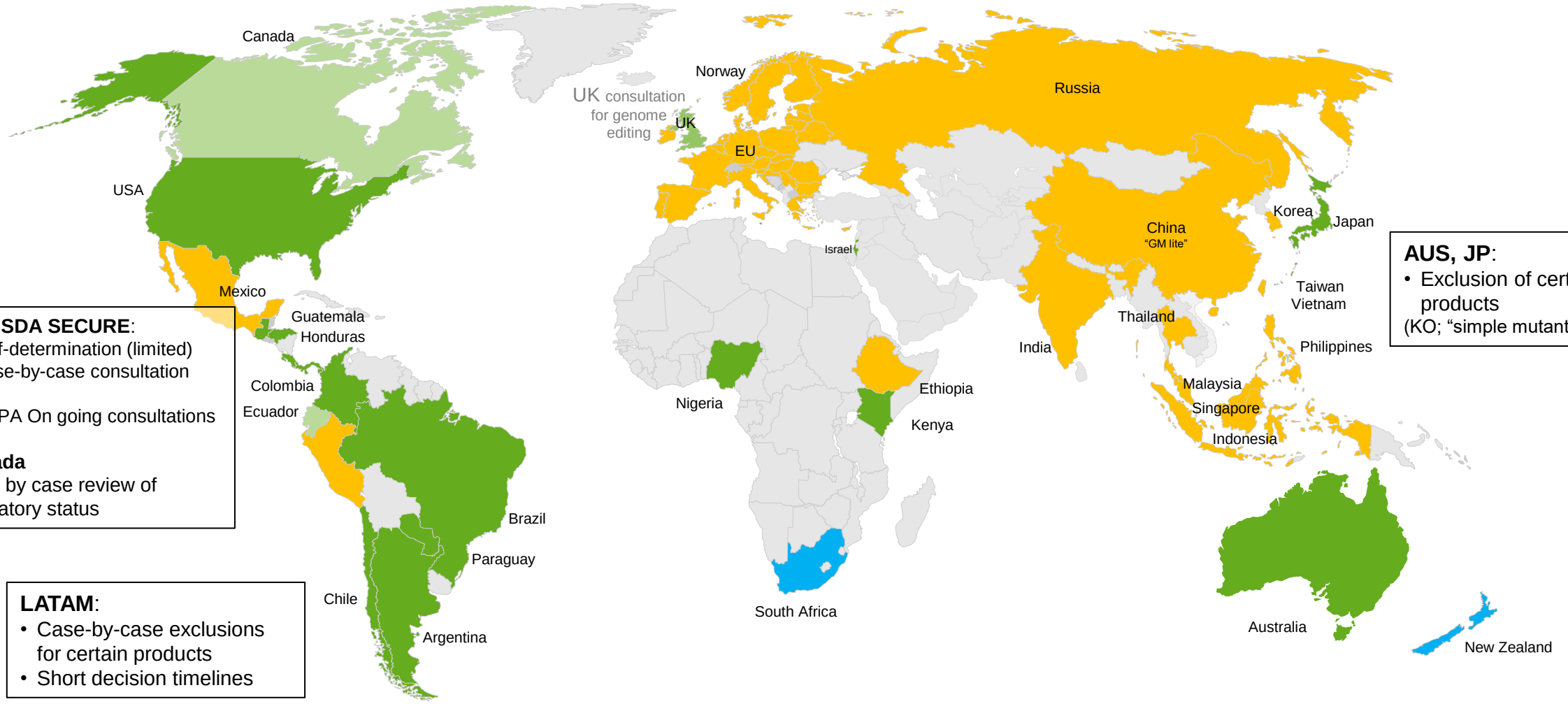
Companies involved in GE crops – US



Regulatory environment for plant products

An increasing number of countries have reviewed or are in the process of revision of their biotech/GMO regulations

Status Oct 2021



US USDA SECURE:
- Self-determination (limited)
- Case-by-case consultation

US EPA On going consultations

Canada
Case by case review of regulatory status

AUS, JP:
- Exclusion of certain products

(KO; "simple mutants" / SDN1)

LATAM:
- Case-by-case exclusions for certain products
- Short decision timelines

Certain products excluded from GMO regulation | **Under GMO regulation and ongoing review** | **Under GMO regulation**

Global gene editing regulatory policies

North & South America

APAC

Europe

Unregulated

Regulated

Current policies in APAC

With exemptions

- Australia (OGTR, FSANZ)
- Japan (MHLW, MAFF)
- Philippines (BPI)
- Singapore
- Indonesia

No defined policy

- Taiwan
- India
- Thailand
- Vietnam

Currently captured in regulations

- China
- Korea

BASF
We create chemistry

Regulatory Policy and Trade

- Regulatory harmonisation of gene edited crops is crucial
- Without regulatory harmonisation the agricultural industry faces the same trade issues that have been plaguing us for decades since the first commercialisation of GM crops.
- The majority of the world is coming to the rational approach applying the principle that like products should be regulated similarly.
- Countries holding out are because of anti GM activist pressure rather than because they disagree with the science.

We create chemistry