

# Plants3D 2021 Fall Design Tournament



# Overview of 2021 Design Tournament



# Goals of the Plants3D Design Tournament

- Address a challenge in the alternative food, flavor, and fragrance industry
- Develop a design solution with IP potential that could be launched as a startup or licensed by an existing company
- Build and work with an interdisciplinary team to develop concept
- Provide RnD funding for the top concept to be supported beyond the tournament

# Problems for the planet

Agriculture is a major contributor to the global climate, water, and extinction crises

40% of land has been converted to agriculture

In 30 years, the population will grow another 40%.

Livestock contributes to ~15% of global GHG emissions

Inefficiencies in traditional agriculture cause environmental problems



# Opportunities in plant/microbe based alternatives to food, flavors and fragrances

**Established protein sources**



SOYBEAN    PEA    LUPINE    POTATO    WHEAT    CORN

**Emerging protein sources**



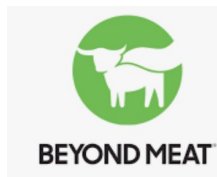
FAVA BEAN    CHICKPEA    LENTIL    MARROWFAT    BEANS    RAPESEED

**Upcoming protein sources**

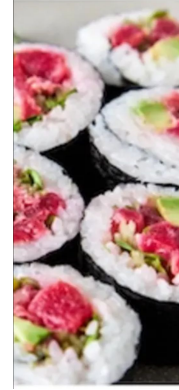


QUINOA    DUCKWEED    SUNFLOWER    GREEN LEAVES    MICRO-ALGAE    INSECTS

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Source: Laurie Pouvreau and Fred van de Velde



# Cellular agriculture produced meats and flavors



**Finless**  
FOODS



# Dairy alternatives



**MOZZA**  
Developing the science to create  
real dairy cheese from plants

About our Cheese

The image features a green background with a bokeh effect. A white hexagonal grid is overlaid on the background, with various icons inside the hexagons: a tree, a globe, a recycling symbol, and a leaf. A small green plant with three leaves is growing from the bottom right of the grid.

**NEW  
CULTURE**

**change™**  
FOODS

**nobell**

**Perfect  
Day**

# Flavors and Fragrances



Givaudan



amyris



LA Times



## PLANT-BASED CONSUMER GOODS

**MEAT** akua ALGAMA *alvego* *alver* amidori **anamma** ASANTE BARBECUE **BEAT** *BeLeaf* Bonduelle *Bom* *Caultron* Caviart *dalya* *Damhart*  
DAIZ EVO fazenda futura FIELD ROAST Foodure. **FRYS** gardein *Gardenburger* GREEN GREAT GINSTERS Garden Gourmet **GOLD & GREEN**  
**GRANAROLO** **greenest.** *GreenMe* growthwell GUSTA **heartbest** Hügli HARI&CO **HERITAGE** heura *How On Earth* **VEGAN** hilcona hilarys **IKEA**  
IMPOSSIBLE INCOGmeato **iglo** JACKFRUIT **Jensen** KARANA LIFE3 **LIKE MEAT** liv laga **LIDL** *maiko* meatish **MIGHTY MEAT** Moolec  
MOON MEALS MorningStar *Mushlabs* **NATURINNI** NATURLI **neat** Nestlé **NO EVIL** NotCo **NUGGS** Odontella *Ojah* **OLJCK** *MD* *OMNIPAI*  
**OMNI** *OhVeg* *Phuture* **PRIMAL** planted. PLANT POWER **REGRAINED** **RILBITE** **ROBI** *Rubisco* **samhoud** **SWEET EARTH** schouten smithfield foods *Veganz*  
s pero *Sunbit* **STARFIELD** *Supersun* **THIS sparc** **Tofurky** Tyson **unisoj** **UNMEAT** **UNREAL** **UPTON'S** *food* *Flites* *Vegafit* **VEGAN CARTEL** *Végky*  
**VerdientFoods** *Vegeat* *Vegg* **veggie Life** *vegini* **Wessanen** **Yamchops** *宜香食品* **WILLAROO'S** *Winko* **WORTHINGTON** **YVES** **ZERO MEAT**  
**alpha** **ALTER-NATIVE FOODS** **ALTERNATIVE MEAT Co** *BEFORE THE BUTCHER* **BETTER CHEW** **better nature** **BEYOND MEAT** **BITE** **BLACK SHEEP FOODS** **CRAFT MEAT CO.** **DARING** **FLOW** **Food Evolution** **good dot** **green wise** *HEBBY LITTE PLANT*  
**DOORAY** *哈粹* **JOY** *ALGEN* **JACKS** **JERKY YALL** *金字* **JUST VEGAN** *les nouveaux fermiers* *let's plant meat* **LOVE SEITAN** **MADE WITH BEAN** **MARVELOUS FOODS** **MARFRIG** **MEET JACK** **MEAT**  
**Mister VEG** **MOVING MOUNTAINS** **MRS. GOLDFARB'S** **Unreal Deli** **nutrition & nature** **NEW BREED** **Ocean Orchards** **PLANT POWER** **PLANT CRAFT** **PRIMA KLIMA** **pure** **RAISED & ROOTED** **rebellious** **Rival Foods** **RÜGENWALDER MUHLE**  
**simple truth** **Sol** **SUNFLOWER FAMILY** **THE ABBOT'S BUTCHER** **THE BETTER MEAT CO.** **The PlantEat** **THE HERBIVOROUS BUTCHER** **THE MEATLESS FARM CO** **THE VEGETARIAN BUTCHER** **THE VERY GOOD BUTCHERS** **unifit meat** **Veggie Victory** **Vantastic foods** **VEGIC** **ver so** **VIV ERA**  
**wholly veggie!** **WICKED HEALTHY** **WTH** *with the health* *珍肉* *ZHEN!* **3D PRINTED** **NOVA MEAT** **redefine meat** **SavorEat**

## EGGS

Clara Foods EVO Moolec *MyEy* *nummy nibbles* *Vegg* **JUST FOLLOW YOUR HEART.** **ZERO EGG.**

## SEAFOOD

**Atlant** *avant* **BONSAN** **FRYS** gardein **HOOKED** **IKEA** *ima* **JINKA** **KULEANA** **Legendary Vish** *Lema* *Marinae* **MIMIC**

## MEATI

**May Wah** *New Wave Foods* **Quorn** *SAVE+SEA* **Seamore** *Tofuna Fish* **TESCO** **TUNO** **VAN+CLEVE** *Vegafit* **VEGEFARM** *food*

**GOOD CATCH** **good dot** **PLANT BASED FOODS** **OCEAN HUGGER** **prime roots** **SoFine Foods** **Sol** **Rival Foods** **Sophie's Kitchen** **THE VEGETARIAN BUTCHER** **VEGAN SEASTAR** **VIV ERA**

## FUNGI - BASED CONSUMER GOODS

**Atlant** *BTRfy* **ecovative** *FOUR SIGMATIC* **FRESHCAP** **Mooba!** *Loop Foods* **MEATI** **MOKU** **NATURLI** *Mushlabs* *Nature Vegan*

**Outstanding** *Pan's Pleasure* **SCelta** **SMALLHOLD** *Végky* **BACK TO THE ROOTS** **BOTANIC BITES** *fable* **JEWELS OF THE FOREST** **MOVING MOUNTAINS** **prime roots** **Quorn** **WILD** *Sol* *WILD*

MILK

Grid of dairy alternatives including Almond, Coconut, Pea, Pumpkin Seed, Quinoa, Rice, Sesame, Soy, and others. Brands like Danone, Califia Farms, and Alpro are featured.

CHEESE

Grid of cheese alternatives including Wheels, Sliced, Shredded & Grated, Blocks & Wedges, Creams & Spreads, and others. Brands like Boudin, Treeline, and Nafisika are featured.

CREAMER section with brands like Califia Farms, Danone, and Alpro.

BUTTER section with brands like Country Crock, Califia Farms, and Earth Balance.

OAT and CASHEW sub-sections with brands like Oatly and Danone.

AVOCADO and OAT sub-sections with brands like Inpe Cado and Danone.

SOY and ALMOND sub-sections with brands like Danone and Califia Farms.

COCONUT and ALMOND sub-sections with brands like Alpro and Danone.

YOGURT section with brands like Chobani, Danone, and Alpro.

FROZEN DESSERTS section with brands like Abbot Kinney's, Fry's, and Alpro.

OTHER/ BLEND section with brands like Blöde Kuh, Forager, and Lavva.

OTHER/ BLEND section with brands like Talenti, Temptation, and Fröner.

# Investigate problems in these alternatives

- Talk to stakeholders
- Explore new companies and potential opportunities
  - <https://newprotein.org/>

# Round 1 Guidelines

1. Individually, present a feasible interdisciplinary project concept. Ideally, it should provide an opportunity for collaboration with others.
2. Timeline for proof-of-concept: 1-2 years.

# Round 1

- 2 minute presentation using the slide template
- Prepare your slide from the template example
- Place your slide in this deck by 11:55AM, Friday Oct 15
- Presentation order will be reverse alphabetical

**Scoring:** Each student will rank the other projects.

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Criteria to be used in scoring project concept

1. Effectively communicated
2. Addresses a challenge within in plant/microbe based alternatives to food, flavors and fragrances industry
3. Bridges disciplines
4. Potential for intellectual property, commercialization
5. Potential to engage undergraduates or STEM education
6. Proof-of-concept in 1-2 years

Score 1 (high) and 3 (low) for each criterion. Sum the score for each presentation. Report the 8 with lowest rank score sum. All sum scores will be totaled to determine the projects that will advance.

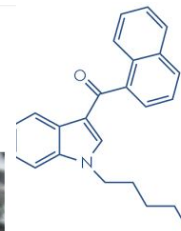
## The Problem

- New substances of abuse are rapidly being designed, mass produced and sold to the public, creating new public health challenges.
- *We need inexpensive methods to rapidly detect new chemical threats as they appear.*
- Technical platforms for rapidly evolving and developing low cost sensors could help address this growing problem

BIRMINGHAM REAL-TIME NEWS

Spice-related overdoses on the rise in Alabama - again; feds warn about 'disturbing' trend

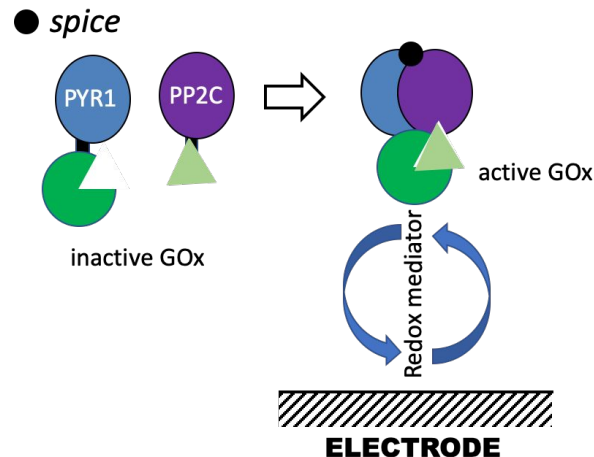
Updated Apr 23, 2019; Posted Apr 23, 2019



## Our approach

- Plant ABA sensors have flexible ligand binding pockets and can be engineered to recognize new ligands.
- Their mechanism of sensing involves chemical induced dimerization, which lends itself well to selection and directed evolution experiments.
- Postdoc Jesus Beltran has developed a spice sensor using our engineering platform; we propose to use protein complementation to create simple devices from our engineered proteins

*Chemically induced dimerization to reconstitute glucose oxidase activity*



# Round 2

- Collaborations evolved from round 1 projects
- 5 minute presentation using the slide template and 5 min questions
- Slides(s) should include the template example
- Place team slides deck by 11:55AM, Friday Oct 29
- Presentation order will be as requested



# Round 3

Saturday Nov. 20th

Collaborations evolved from round 2 projects

Must fill following positions:

**CEO:** lead team, coordinate project, present

**CSO:** Develop technology/science approach

**VP of production:** Develop plan to scale and commercialize technology

**VP of business development:** Market research, computer analysis, financial model, product market fit, customer discovery

**Advisors:** Faculty, RED, stakeholders, etc

# Round 3

- 5 minute presentation using the slide template and 7-10 min questions
- Slides(s) should include the template example
- Place team slides deck by Nov 20
- Presentation order will be as requested
- Presentations will be evaluated by expert panel
- Winning project will be funded **\$5000** for materials/supplies and instrumentation core services (i.e., metabolomics/sequencing)

# Questions?



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