Evogene’s Ag-Biologicals Division

Microbiome driving crop productivity

Introduction

Ido Dor, EVP & GM, Ag-Biologicals
Jan 2018

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‘Evogene Inside’ – introduction to Evogene

Evogene’s Ag-Biologicals Division

Summary
What We Do

We develop novel products for life-science markets... through the use of a unique computational predictive biology platform.
Evogene at a Glance

- **Computational Predictive Biology (CPB) Platform** - applied to identify:
  - Genetic elements for improved seeds
  - Chemical compounds for innovative Ag-Chemicals
  - Microbes for novel Ag-Biologicals

- **Strategic collaborations with world-leading agriculture companies** - including BASF, DuPont, Monsanto, Syngenta, ICL

- **Revenue model** - based on licensing agreements, which typically include three main revenue streams:
  - R&D payments - short term
  - Milestone payments - mid term
  - Royalties from product sales - longer term

- **Subsidiaries** -
  - Evofuel (100%) - Castor Seeds
  - Biomica (90%) - Human Microbiome

- **Financial fundamentals** -
  - Cash position - $76 million (September 30th, 2017), no debt
  - Listed on TASE (2007) and NASDAQ (2013)
Computational Predictive Biology (CPB) Platform

Science: unique multidisciplinary scientific approach

Analysis platforms using machine learning/AI to identify candidates
- ATHLETE™
  - Gene discovery
- PointHit™
  - Chemical discovery
- PlaNetNG
  - Stack discovery
- Gene2Product™
  - Gene optimization
- PoinTar™
  - Target discovery
- BiomeMiner™
  - Toxin discovery
- MicrobeMiner
  - Microbial Discover/Optimization

Driving Innovation ‘Connecting the Dots’

Tailored big data
- Expression
- QTL
- Phenotypic
- Metabolomics
- Meta-genomics
- PPI
- Structure
- Genome

Interconnected data hub
- Plant gene centric – 10K
- Microbial gene centric – 150K
- Microbial centric – 20K
- Chemical centric – 150K
Predictive Analysis and Development System
Corporate Structure

Computational Predictive Platform

Ag Divisions
- Seeds
- Biologicals
- Chemicals

Subsidiaries
- Evofuel
- BIOMICA
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Evogene’s Ag-Biologicals Division

- Ag-Biologicals Market
  - Vision & Strategy
  - Technology
  - Pipeline & Collaborations

Summary
Industry Challenges & Opportunity

Need for innovation
- Increasing resistance
- Regulation pressure
- Decline in product introductions

Green and Safe
- Awareness, regulations and practices

Time To Market
- Shorter time and lower cost compared to alternatives –
  - Ag Chemicals
  - Ag Biologicals

Ag-Biologicals - a new pillar in agriculture productivity

- Seeds & Traits: ~$40B
- Ag-Chemicals: ~$50B
- Fertilizers: ~$100B
- Ag-Biologicals: ~$50B
## Ag-Biologicals

### Products derived of natural sources

#### Ag-Biologicals Sources:

<table>
<thead>
<tr>
<th>Plant Extracts</th>
<th>Microbial</th>
<th>Macrobials</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Plant Extracts" /></td>
<td><img src="image2.png" alt="Microbial" /></td>
<td><img src="image3.png" alt="Macrobials" /></td>
</tr>
<tr>
<td>Plant derived chemistry</td>
<td>e.g. bacteria or fungi</td>
<td>Pest natural enemies</td>
</tr>
</tbody>
</table>

#### Bio-Stimulants

Mediating plants’ response to optimize yield potential

![Bio-Stimulants](image4.png)

#### Bio-Pesticides

Support the plant by reducing pest damage to the plant

![Bio-Pesticides](image5.png)
Ag Biologicals Market

~$3.2B* in 2015

- Bio-stimulants: 38%
- Bio-pesticides: 62%

* Source: Phillips McDougall, 2015

Rapid growth sector

~$8B

~$3.2B

2015

2022 E

Source – 2022 estimation based on integrated information of BCC Research, marketsandmarkets, Agropages and Phillips McDougall

Fast growing sector with potential to complement Ag-Inputs market
Industry Recognition of the Microbiome Opportunity

Major Ag companies – actively invest in order to build position

Emerging startups – significant investments in recent 2-3 years
The Microbiome Opportunity
Billions of Microbes Matter!

Microbiome is driving crop’s productivity

- In and on the plant
- Below and above ground

Human microbiome understanding

Leveraged to plant microbiome research
The Microbiome Opportunity
Potential Microbiome Derived Ag-Biological Products

Ag-Biological Products

Microbes
Extracts
Natural Molecules

Microbiome
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Summary
Ag-Biologicals Division’s Goal
Increasing crop’s productivity through **productive microbiome**

To introduce environmentally safe and effective microbiome based Ag-Biological products driving crop’s productivity

Addressing Key Challenges

Addressing key challenges of:
- **Efficacy**
  - Significant improvement / protection of yield
- **Stability**
  - Consistency across germplasms / geographies
- **Commercial viability**
  - Shelf-life COGS

Position on Value Chain

- Short time to market
- End to end capabilities for product development
Product Offering
Evogene’s Ag-Biologicals Product Strategy

Maintain a balance between Row and Specialty crops & market access
- Establish Crop X Product focus to support direct market access

Balance product programs to include both Bio-stimulants and Bio-pesticides
- Leverage of existing assets
- Aim to build a ‘plant health’ product concept

Enabling technology to drive product stability and performance

Product focus
- Leverage existing programs to address new product types
- Option to address all activity space area through funded collaborations

Cost effective application paths
Model A – Indirect Market Access

- Focus mainly on **row crops**
- Go-to-market based on partners channel

Model B – Direct Market Access

- Focus mainly on high value **specialty crops**
- Commercialization through distributors / strategic licensing agreements
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Summary
Decoding complex plant - pest - microbiome interaction for the identification of genetic elements with desired features for the development of microbial based products
Utilizing a proprietary *Computational Predictive Biology (CPB)* Platform harnessing the power of plant’s, pest’s & microbiome *OMIC BIG DATA* through advanced informatics

**Proprietary Interconnected Data Hub**
- Interconnected
- 5 Petabytes
- 10’s *OMIC* data types
- K’s proprietary experiments: Lab>>GH>>Field

**Informatics-Analysis and Design**
- Analysis & machine learning modules for product research and development
- Proprietary sets of genetic elements and functions

**Bio-Validation**
- Lab>> GH>> Field
- Y&ABST, Fungi, Insects
- Advanced phonemics

**Novel Ag-Biologicals Products**
Utilizing a proprietary Computational Predictive Biology (CPB) Platform harnessing the power of genotypic & phenotypic BIG DATA through advanced informatics

Proprietary Interconnected Data Hub

Informatics-Analysis and Design

Data

Bio-Validation

Results

Predictions

Novel Ag-Biologicals Products
CPB Platform to Support Product Development

Utilizing a proprietary *Computational Predictive Biology (CPB)* platform harnessing the power of genotypic & phenotypic BIG DATA through advanced informatics.

Proprietary Interconnected Data Hub

Informatics - Analysis and Design

Bio-Validation

Predictions

Results

Data

Novel Ag-Biologicals Products
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- Pipeline & Collaborations

Summary
## Ag – Biological Product Portfolio

### Pipeline

<table>
<thead>
<tr>
<th>Bio-Stimulants</th>
<th>Bio-Insecticides</th>
<th>Bio-Fungicides</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Corn</td>
<td>2 Wheat</td>
<td>3 Corn Root Worm</td>
</tr>
<tr>
<td>4 Stink-Bug - soy</td>
<td>5 Lepidoptera - specialty</td>
<td></td>
</tr>
<tr>
<td>6 Fusarium biofungicide - Corn</td>
<td>7 Mildews Bio-Fungicide - grapes</td>
<td></td>
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Legend:
- **Discovery**
- **Early Development**
- **Development stage 1**
- **Development stage 2**
- **Pre-commercialization**
Results
Bio-Stimulants examples

10% Yield improvement in field trials (2016, 2017)
Under moderate drought

EVO004

None - inoculated  
Main ears at harvest

EVO004

Stem below ear R2

10 15

Main ears at harvest

None - inoculated  
Ear R3

14 1

16 1

EVO004

Stem below ear R2

10 15

Ear R3

15 20

15 20
Results
Bio-Stimulants examples

18% yield increase in field (2017)
EVO33394+EVO33393

Under moderate drought

13% yield increase in field (2017)
EVO33394+EVO33402

Under moderate drought
DuPont Pioneer & Evogene Announce Multiyear Research Collaboration for Development of Corn Bio-Stimulant Products
Results
Bio-Insecticides examples (initial Lab, Greenhouse)

Western corn root worm
~85% increase in leaf area
~60% reduction in insect survival

Fall Army Warm
Leaf disk assay results

EVO30013

BL
Results
Bio-Fungicides examples (Greenhouse)

Fusarium in corn - ~70% reduction in disease severity
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Evogene’s Ag-Biologicals Division
Value Creation Roadmap

- Phase advancement
  - Bio-Stimulants & Pesticides
  - New collaboration
- Additional strategic collaboration
  - Patent grant - strains
  - New product program
- Early commercialization of Technology
  - Milestone payment
  - Patent grant - technology
- Initial revenue from first product
- Expansion into new territories and product types

2018
2019
2020
2021
Summary

1. Ag–Biologics - fastest growing sector in Agriculture inputs, expected to reach $8B in 2022

2. Ag-Biologicals time to market is relatively short due to favorable regulatory landscape

3. Microbiome is a promising opportunity to drive Ag-Biologicals market’s expansion

4. Evogene’s Computational Predictive Biology platform (CPB), combining biological understanding and cutting-edge computational technology is key for next generation product development

5. Initiated in 2015, Evogene already generated valuable product pipelines for bio-stimulants & bio-pesticides is in place – potential 1st product launch in 2021
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