Venture investing: Biotech for Cleantech

Biotechnology in agriculture overview
February 2011
Public acceptance

• **Very poor introduction in Europe**
  – over promised
  – no consumer benefit – input traits
  – technical gaps that could be exploited
  – lack of consumer knowledge of the regulatory system
  – poor communication by corporate, media and government

• **But Europe is not the world**
  – adoption in Americas
  – seen as essential in India, Asia, China
  – two trillion ‘GM meals’ eaten with no issues
  – 130m hectares – fast growth
Growth in GM crops in the US

- 12 years
- 130m hectares
- $3.5Bn gross profit
Drivers in food production

- Environment
- Available land
- Biofuels
- Water

Population growth: now 6.8 bn to 7.4 – 10.6 by 2050

Demand for meat: water x5 min, land x6 min
Future of food and farming

• ‘nearly a billion people in the world are left hungry, with another billion suffering from dietary deficiencies; at the same time, agriculture is continuing to degrade the natural environment in a fundamentally unsustainable way’. Steve Connor Independent

• “we have 20 years to deliver something of the order of 40 per cent more food, 30 per cent more available fresh water and of the order of 50 per cent more energy” Professor Sir John Beddington
Global ‘blue water’ demand set to rise 35-60% between 2000 and 2025
Biotechnology in agriculture

**Breeding**
- yield
- disease
- strength

**‘Input’ traits** (resistance)
- herbicide
- insecticide
- disease

**Tolerance**
- water stress
- salt
- cold tolerance

**‘Output’ traits**
- oil production
- oil quality
- shelf life

**Biofuel traits**
- biomass yield
- cell wall
### Top ten pesticide companies

<table>
<thead>
<tr>
<th>Company</th>
<th>Turnover US $ billions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bayer</td>
<td>7.4</td>
</tr>
<tr>
<td>Syngenta</td>
<td>7.3</td>
</tr>
<tr>
<td>BASF</td>
<td>4.3</td>
</tr>
<tr>
<td>Dow</td>
<td>3.8</td>
</tr>
<tr>
<td>Monsanto</td>
<td>3.6</td>
</tr>
<tr>
<td>Dupont</td>
<td>2.4</td>
</tr>
<tr>
<td>Makhteshim</td>
<td>1.9</td>
</tr>
<tr>
<td>Nufarm</td>
<td>1.5</td>
</tr>
<tr>
<td>Sumitomo</td>
<td>1.2</td>
</tr>
<tr>
<td>Arysta</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>34.3</strong></td>
</tr>
</tbody>
</table>

**Source:** Agrow World Crop Protection News 2008
Waves of activity

• First Wave: Enabling technology
  – transformation
  – molecular tools
  – promoters
  – traits

• Second Wave: germplasm – route to market
  – scramble for germplasm
  – seeds industry bought by technology companies

• Third wave: trait development
  – sequencing and genomic data cheap
  – enabling technology patents fall
  – biodiversity protection

1997 $1Bn Holden
1998 $2.5Bn De Kalb
2005 $1.4Bn Seminis
2009 $385m Athenix

The competitive environment has changed in the last 5 years
Trends

- **Agriculture likely to follow red biotech model**
  - growth of biotech sector

- **Multinationals as first route to market - regulatory costs, market access**
  - but new class of companies emerging especially in Brazil, India and China

- **Government support to biotech – far greater in Asia**
  - US/Europe hold advantage but can we capitalise on this?
  - market access options increase

- **Rapid growth in environmentally friendly approaches and IPM**
  - customer preference
  - price increase brings new economics
Exosect: Protecting Food Throughout Supply Chain

Pollination & Bee Health
Seed Treatment
Agriculture
Commodity Storage
Food Processing
Retail Consumer

Entostat: minimising pesticide residues

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Dengue fever

- 50 -100 million cases pa
- One main vector worldwide; *Aedes aegypti*
- Invasive species in most countries
- Symptoms – joint/muscle pain ‘Breakbone fever’
- Severe form Dengue Haemorrhagic Fever (DHF)
- No medication or vaccine
- Same vector – Chikungunya and Yellow Fever

Dengue is a global unmet health challenge
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Cayman suppression trial 2010

July: target release level achieved
August: *Aedes aegypti* population starts to decline
October: control achieved
dengue market entry

Dengue fever risk areas

2010
2011
2012
Thank you!