

Global Seed Industry Concentration – 2005

ISSUE: 2004-2005 saw an upsurge in seed industry takeovers and a shake-up in rankings. Today, the top 10 companies control half of the world's commercial seed sales. With a total worldwide market of approximately US\$21,000 million per annum, the commercial seed industry is relatively small compared to the global pesticide market (\$35,400 million), and it's positively puny compared to pharmaceutical sales (\$466,000 million). But corporate control and ownership of seeds – the first link in the food chain – has far-reaching implications for global food security. This *Communiqué* examines seed industry consolidation and other recent trends in the commercial seed industry.

IMPACT: With control of seeds and agricultural research held in fewer hands, the world's food supply is increasingly vulnerable to the whims of market maneuvers. Corporations make decisions to support the bottom line and increase shareholder returns – not to insure food security. Ultimately, seed industry oligopoly also means fewer choices for farmers. A new study by the US Department of Agriculture examines the impact of seed industry concentration on agbiotech research. The study concludes that reduced competition is associated with reduced R&D. Despite seed industry claims to the contrary, concentration in the seed industry is resulting in *less* innovation – not more.

PLAYERS: A fistful of transnational firms, the Gene Giants, dominates global seed sales. Monsanto, Dupont, Syngenta – all among the world's top-ranking pesticide firms – lead the pack.

POLICY: Seed industry concentration is already high on the agenda of civil society and farmers' organizations that are working to support and maintain peasant and farmer-controlled seed systems and against policies and technologies that seek to further privatize seeds. The implications of seed industry consolidation for food security and biodiversity must also be urgently addressed by governments at the FAO Conference in November and by the UN Convention on Biodiversity in 2006.

World's Top 10 Seed Companies + 1

Company	2004 seed sales
1. Monsanto (US) + Seminis (acquired by Monsanto 3/05)	\$2,277 ¹ + \$526 <i>pro forma</i> = \$2,803
2. Dupont/Pioneer (US)	\$2,600
3. Syngenta (Switzerland)	\$1,239
4. Groupe Limagrain (France)	\$1,044 ²
5. KWS AG (Germany)	\$622 ³
6. Land O' Lakes (US)	\$538 ⁴
7. Sakata (Japan)	\$416 ⁵
8. Bayer Crop Science (Germany)	\$387 ⁶
9. Taikii (Japan)	\$366 ⁷
10. DLF-Trifolium (Denmark)	\$320 ⁸
11. Delta & Pine Land (US)	\$315

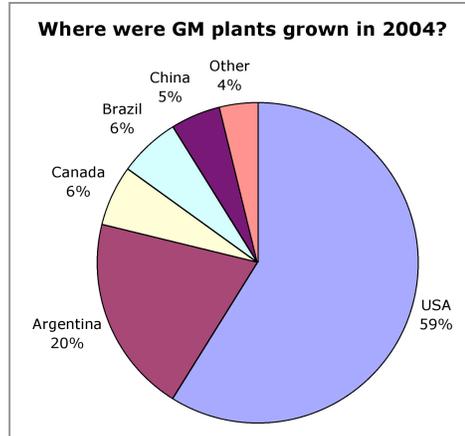
Oligopoly • noun: a state of limited competition, in which a market is shared by a small number of producers or sellers. Source: *Askoxford.com*

ETC Group's new chart, *Who Owns Whom? Seed Industry Concentration – 2005*, offers a more detailed look at many of the corporate seed sector's biggest global players, including acquisitions and subsidiaries (see Appendix).

ETC Group will release *Oligopoly, Inc. – 2005* later this year. It will examine concentration in corporate power in additional sectors, including agrochemicals, biotech, animal pharma, the pharmaceutical industry, food retail and food & beverage processing.

What’s the value of the global seed market?

Expert opinions vary – a lot. According to the International Seed Federation, the estimated size of the market for seed and other planting material in 56 selected countries in 2005 was US\$25,243 million.⁹ ETC Group believes that the figure overstates the value, particularly because ISF’s figures include “other planting material” – which is not defined.



for one quarter of the total value of the commercial seed market worldwide.¹⁰ The market for biotech seed traits (herbicide tolerance and insect resistance) has shot up from \$280 million in 1996 to \$4,700 million in 2004 – a 17-fold increase over the past nine years.

In 2004, Pioneer/Dupont earned 50% of its seed revenues from varieties that included a genetically modified trait. For 2005 Dupont offers the following products for the US market:

Pioneer/Dupont Product Offerings USA, 2005

Seed Product	Total # of Seed Varieties	# with Biotech Traits	Percent
Maize/corn	298	150	50%
Soybean	107	89	83%
Canola	9	4	44%

A July 2005 report by Phillips McDougall, UK-based agribusiness industry analysts, puts the value of the commercial seed market at US\$19,000 million – and estimates that the top 10 companies control 51% of the total market.

Given the enormous disparity in the figures, ETC Group estimates that the commercial seed market falls somewhere in between. **Using an estimated market value of \$21,000 million for commercial seed sales worldwide, ETC Group conservatively estimates that the top 10 companies control 49% of the global seed market.**

The growth in GM seed market share is remarkable, especially given that genetically modified seeds have been accepted in relatively few countries and continue to be steeped in controversy all over the world. The lesson? When a few giant firms make up the cast of characters in the commercial GM seed market, it isn’t necessary to have a superior product to win market share.

2005 saw an upsurge in seed industry takeovers and a shake-up in rankings. The perennial kingpin, Dupont’s Pioneer Hi-Bred International, was dethroned from the top spot when Monsanto acquired Seminis in January 2005 for \$1,400 million. With the acquisition of Seminis, Monsanto became the world’s leading seed company – and the world’s biggest commercial vegetable seed company. (See more details on Monsanto, next page.)

“What kind of industrial strategist—and we must assume there was strategy at some point—would try to stealthily bring to market products that no one needs but everyone has to consume, that the most industry-friendly politician would have difficulty justifying and whose only apparent redeeming feature is to improve the market positioning of the companies that make them?” – Editorial, *Nature Biotechnology*, September, 2004

Seed Industry Concentration – Who Cares?

Whether we’re talking about sneakers, washing machines, beer or cell phones – corporate concentration is ubiquitous. In 2005, Adidas tied the knot with Reebok, Procter & Gamble gobbled Gillette, Molson guzzled Coors, SBC acquired ATT,

Given the fast pace of mergers and acquisitions, we expect that the top 10 rankings will flip-flop again soon.

Despite controversy and lack of public acceptance – genetically modified (GM) seeds are gaining market share. According to Phillips McDougall, genetically modified seeds now account

Verizon merged with MCI and Maytag is wooing Whirlpool. But seeds are fundamentally different from razors and running shoes. When ownership of seeds – the first link in the food chain – is tightly held by a fistful of transnational firms – the world’s food supply becomes vulnerable to the whims of market maneuvers. Corporate boards make decisions to support the bottom line and increase shareholder returns – not to insure food security.

Monsanto – The World’s Largest Seed Company – At a Glance

In 2004, Monsanto’s biotech seeds and/or trait technology accounted for 88% of the total GM crop area worldwide.¹¹ According to Monsanto, its biotech trait acreage covered 175.7 million acres in 2004 – roughly the size of Zambia. (one acre = .4047 hectare)

Monsanto’s share of GM crops:¹²

- **GM Soybeans** – Monsanto accounted for **91%** of the worldwide GM soybean area in 2004. (119.5 million acres GM soybeans worldwide; Monsanto GM soybean 109 million acres)
- **GM Maize** – Monsanto accounted for **97%** of the worldwide GM maize area in 2004. (47.7 million acres GM maize worldwide; Monsanto GM maize 46.4 million acres)
- **GM Cotton** - Monsanto accounted for **63.5%** of the worldwide GM cotton area in 2004. (22.2 million acres GM cotton worldwide; Monsanto GM cotton 14.1 million acres)
- **GM Canola** - Monsanto accounted for **59%** of the worldwide GM canola area in 2004. (10.6 million acres GM canola worldwide; Monsanto GM canola 6.3 million acres)

Note: These statistics are based on industry sources: Monsanto and ISAAA.

Global Seed Market Share: Corn/Maize – Monsanto controls 41% global market share
Soybeans – Monsanto controls 25% global market share

Cotton: In April 2005 Monsanto acquired **Emergent Genetics** for \$300 million. Emergent is the third largest cotton seed company in both India and the US, with approximately 12% of the US cotton seed market and 10% of the Indian hybrid cotton seed market.

Monsanto Takes the Garden Path

With the January 2005 acquisition of Seminis for \$1,400 million, Monsanto takes a dominant position in the fast-growing vegetable seed market – a previously untapped seed segment for Monsanto. Under a variety of brand names, Seminis supplies over 3,500 seed varieties to fruit and vegetable growers in 150 countries. The Seminis acquisition includes the following brands:

- Royal Sluis
- Petoseed
- Bruinsma
- Asgrow Vegetable Seeds

For Monsanto, “vegetable seed is the next logical strategic move” because it’s a “high value, high growth segment in agriculture.”¹³ According to Monsanto, seed and trait gross profit as percent of sales is higher for vegetables (64%) than for soybeans (63%) or for corn (57%). Monsanto now assumes a leading market share in the global vegetable seed market, where they were virtually invisible before:

Beans	Monsanto controls 31% of the global seed market
Cucumbers	Monsanto controls 38% of the global seed market
Hot Pepper	Monsanto controls 34% of the global seed market
Sweet Pepper	Monsanto controls 29% of the global seed market
Tomato	Monsanto controls 23% of the global seed market
Onions	Monsanto controls 25% of the global seed market

A new study by the US Department of Agriculture looks at how seed industry concentration affects research.¹⁴ In the US, private sector spending on crop variety R&D increased 14-fold between 1960 and 1996, while public expenditures stagnated. It's widely acknowledged that intellectual property laws (plant breeders' rights and patents) that give companies exclusive monopoly rights over plant varieties spurred seed industry concentration. Looking at biotech maize, cotton and soybeans, USDA researchers found that research intensity slowed as seed markets became more concentrated. "Those companies that survived seed industry consolidation appear to be sponsoring less research relative to the size of their individual markets than when more companies were involved... Also fewer companies developing crops and marketing seeds may translate into fewer varieties."¹⁵

The USDA study also notes that public research on crop variety R&D "has a stimulative effect on private biotech research." The authors conclude that increasing publicly funded research for plant breeding "would not only sustain the oft-documented high rates of public return to public research, but could also promote additional private research." The moral of the story? In the case of agbiotech in the USA, reduced competition is associated with reduced R&D. Despite seed industry claims to the contrary, concentration in the seed industry has resulted in less innovation – not more. Ultimately, a highly concentrated seed market means less choice for farmers – not more.

Milestone or Miasma? According to zealous proponents of biotech, "sometime during the early days of May 2005, a farmer somewhere in the world" planted the 1 billionth acre of biotech crops (400 million hectares).¹⁶ For supporters of GM crops, tracking the total number of acres planted with genetically modified seeds is like McDonald's posting the number of hamburgers served under the golden arches:

"Today, we mark a billion acres. At some point in the future, like McDonald's, so many billion acres of biotech crops will have been planted and harvested around the world that we'll quit counting these biotech acres altogether." – Truth About Trade and Technology, an advocacy group that supports free trade and agricultural biotechnology, Des Moines, Iowa, USA.

The global proliferation of hamburgers sold by the world's mega fast-food enterprises is an apt comparison to the spread of the Gene Giants' biotech seeds: There are enormous social costs imposed by the ubiquity of these corporate products – costs that are not usually recognized or addressed until after the product/technology is widely deployed.

Take GM contamination, for example – unwanted gene transfer via cross-pollination from GM crops to conventional or organic crops nearby. In the early days of biotech it was discussed as a remote possibility, it soon became a reality, then a nuisance, and now a crisis (for some). With the rapid expansion of GM crop area, farmers are finding it increasingly difficult to produce purely non-GM varieties. According to Canadian researchers writing in *Ecological Economics* earlier this year, "Loss of, or limited ability to produce certified non-GM crops has the potential to impose significant production and consumption externalities on producers, consumers and other downstream users."¹⁷ They note that "the opportunity costs to farmers could rise dramatically as the number of GM-free producing areas declines, especially if disgruntled consumers choose simply to avoid food product lines with GM content."

Today, scientists are sparring over how to measure GM contamination and what it means. Regulators and scientists are trying to determine isolation distances to thwart pollen dispersal and cross-pollination. At least 28 governments plus the European Union are grappling with requirements for the labeling of GM foods, and how to set tolerance levels for GM content (in non-labeled foods). Consumers in some markets are rapidly losing the ability to choose non-GM foods, or must pay more to avoid biotech. Farmers who choose not to grow GM crops are faced with loss of markets if their crops are contaminated, or lawsuits if unauthorized patented genes are found on their property.

How will society deal with social costs imposed by GM crops and GM contamination? Who will decide? Who will pay? The Canadian researchers offer two troubling suggestions: "...either a tax on GM growers could be used to compensate non-GM growers for any loss of income due to co-mingling or, alternately, non-GM growers could pay GM growers to restrict their planting." Both proposals

are unacceptable because neither puts the burden squarely on the source of the contamination: the biotech industry.

There are ominous signs that policy decisions are being made to accommodate the Gene Giants and to transfer the costs and burdens of GM contamination to farmers and consumers.

In the United States, state governments are passing laws ghost-written by the biotech industry that make it illegal for local governments to ban or restrict genetically modified crops. Determined not to allow local prohibitions of GM crops like those approved by three counties in California, the industry has pushed at least 14 states to pass preemption bills that are designed to mute citizen concerns about GM crops.

Another example is that the seed industry and allied governments are aggressively promoting Terminator seed technology as a viable method to stop gene flow. Delta & Pine Land, the US-based company that is actively developing genetic seed sterilization, makes the outrageous and scientifically unsupportable claim that Terminator “provides the biosafety advantage of preventing even the remote possibility of transgene movement.”¹⁸

New seed laws are being adopted in many countries that aim to restrict the rights of farmers to control and use their seeds. An in-depth report by GRAIN examines the imposition of new, repressive seed laws that are replacing older seed legislation in many countries.¹⁹ According to GRAIN, “the main purpose of these seed laws is to provide better protection of private seed varieties developed by companies and sideline farmers’ own seeds completely.”

GM Seeds and Pesticides – Another Industry Myth Shattered: Since the early days of biotech, the industry has promised that genetically modified seeds would reduce the use of pesticides in agriculture. A 2004 study by Charles M. Benbrook looks at GM crops and pesticide use in the US from 1993-2004 (the US accounts for 60% of the total GM crop area worldwide). The study concludes that overall the use of agrochemicals on GM crop acreage has risen about 4.1% since 1996. The findings contradict the industry’s oft-repeated claim that biotech crops reduce pesticide use in agriculture. According to Benbrook:

GE [genetically engineered] corn, soybeans and cotton have led to a 122 million pound increase in pesticide use since 1996. While Bt crops have reduced insecticide use by about 15.6 million pounds over this period, HT [herbicide tolerant] crops have increased herbicide use 138 million pounds. Bt crops have reduced insecticide use on corn and cotton about 5 percent, while HT technology has increased herbicide use about 5 percent across the three major crops. But since so much more herbicide is used on corn, soybeans and cotton, compared to the volume of insecticide applied to corn and cotton, overall pesticide use has risen about 4.1 percent on acres planted to GE varieties. – Charles M. Benbrook, “Genetically Engineered Crops and Pesticide Use in the United States: The First Nine Years.” Biotech InfoNet, Technical Paper Number 7, October 2004.²⁰

Farmers are being forced to apply greater amounts of herbicides on genetically modified herbicide tolerant crops because some weeds have developed resistance in the face of heavy reliance on herbicide tolerant crops. Benbrook finds that “reliance on a single herbicide, glyphosate, as the primary method for managing weeds on millions of acres planted to HT varieties” is the primary factor that requires farmers “to apply more herbicides per acre to achieve the same level of weed control.”

Glyphosate, the world’s most commonly used agricultural chemical, is typically considered less hazardous than other chemical weedkillers. But new studies on glyphosate, and Monsanto’s proprietary formulation, RoundUp, raise serious concerns about the safety of the chemical for human health and the environment.²¹ About three-quarters of the worldwide area devoted to GM crops last year was planted with crops engineered to tolerate spraying of glyphosate.

Conclusion: Seed industry consolidation means less competition, resulting in fewer choices for farmers and greater vulnerability for local farming communities and global food security. Choices are further reduced with the spread of GM contamination encroaching on conventional and organic crops.

Who Owns Whom? Seed Industry Concentration – 2005

ETC Group's list includes many of the world's largest seed companies and their acquisitions and/or subsidiaries. It is not a comprehensive list of all seed companies, but includes many of the top 20 firms that sell commercial field, vegetable and garden seeds.

Seed Company	Subsidiaries/Acquisitions	Comments
Royal Barenbrug Group (Netherlands)	<ul style="list-style-type: none"> ▪ Barenbrug Belgium ▪ Barenbrug China ▪ Barenbrug France ▪ Barenbrug Holland BV ▪ Barenbrug Luxembourg ▪ Barenbrug Polska ▪ Barenbrug South East ▪ Barenbrug UK ▪ Barenbrug USA ▪ Barenbrug Production ▪ Heritage Seeds Pty (Australia) ▪ Modern Forage Systems Inc ▪ New Zealand Agriseeds ▪ Palaversich y Cia (Argentina) 	Specializes in forage crops and turf grass. 20 subsidiaries in 12 countries. Annual sales: €160 million in 2004.
BASF (Germany)	<ul style="list-style-type: none"> ▪ SunGene (Germany) ▪ Metanomics ▪ ExSeed Genetics LLC 	BASF, the world's largest chemical company, holds 40% equity stake in Svalof Weibull (see below).
Bayer (Germany) Subsidiary: Bayer CropScience	<ul style="list-style-type: none"> ▪ Aventis CropScience (6/02) ▪ AgrEvo ▪ Plant Genetic Systems ▪ Nunhems BV ▪ Nunza BV ▪ Sunseeds ▪ Cannon Roth ▪ Pioneer Vegetable Genetics ▪ Dessert Seed ▪ Leen de Mos (Neth. & Spain) ▪ Castle Seed ▪ Keystone Seed ▪ Genex (Australia) ▪ AgrEvo Cotton Seed Intl. (Australia) ▪ Biogenetic Technologies ▪ Sementes Ribeiral (Brazil) ▪ Mitla Pesquisa Agricola (Brazil) ▪ Sementes Fartura (Brazil) ▪ Granja 4 Irmaos (Brazil) ▪ Associated Farmers Delinting ▪ Gustafson (3/04) 	In 2002 Bayer purchased Aventis CropScience (formed by the 1999 merger of Hoechst and Rhone Poulenc). Nunhems is one of top 5 vegetable seed companies in the world. Bayer CropScience 2004 annual seed sales: €311 million
DLF Trifolium (Denmark)	<ul style="list-style-type: none"> ▪ DLF International Seeds (USA) ▪ DLF-TRIFOLIUM Ltd. (UK) ▪ Hladké Zlvoťice s.r.o (Czek Rep.) ▪ Top Green (France) ▪ Prodana Seeds ▪ DLF Group China ▪ Danespo Holding A/S (50%) ▪ DLF Seeds Ltd. (NZ) ▪ DLF-TRIFOLIUM A/S, Moscow ▪ DLF-TRIFOLIUM Deutschland ▪ Cebeco Seeds Group (The Netherlands) ▪ Cebeco Saaten GMBH ▪ Cebeco Seeds S.R.O. ▪ Cebeco-Verneuil GMBH & Co. KG ▪ Cebeco Zaden B.V. ▪ La Maison Des Gazons S.A. ▪ N.V. Zaden Van Engelen S.A. ▪ Oliver Seeds Ltd. ▪ Proco Sem S.A. 	World's largest breeder of cool season clover and grass seed. Purchased Cebeco Seeds Group in 2003 (grains and flax). Annual turnover US\$320 million (for year ending 31 May 2004).

Seed Company	Subsidiaries/Acquisitions	Comments
DLF Trifolium (continued)	<ul style="list-style-type: none"> ▪ Seed Innovations Ltd. ▪ Wiboltt Fro A/S 	
Delta & Pine Land (USA)	<ul style="list-style-type: none"> ▪ Ellis Brothers Seed ▪ Arizona Processing ▪ Mississippi Seed Co. ▪ Hartz Cotton ▪ Sure Grow Seeds ▪ D&PL South Africa, Inc. ▪ D&PL Semillas Ltda (Costa Rica) ▪ Deltapine Australia Pty. Ltd. ▪ Turk DeltaPine, Inc. (Turkey) ▪ Deltapine India Seed Private Ltd. ▪ D&M International, LLC: ▪ D&PL China Pte Ltd. ▪ Hebei Ji Dai Cottonseed Technology Company Ltd. ▪ CDM Mandiyu S.R.L. (Argentina) ▪ MDM Sementes De Algodao, Ltda. (Brazil) ▪ DeltaMax Cotton, LLC (50%) 	World's largest cotton seed company. Developer of Terminator Technology. Annual sales, 2004: US\$315 million
Dow Chemical Co. (USA) Subsidiary: Dow Agrosciences	<ul style="list-style-type: none"> ▪ Mycogen ▪ Agrigenetics ▪ Cargill Hybrid Seeds ▪ United Agriseeds ▪ Morgan Seeds (Argentina) ▪ Kelten & Lynks ▪ Delta & Pine Land (corn & sorghum only) ▪ Dinamilho Carol Productos (Brazil) ▪ Híbridos Colorado Ltda. (Brazil) ▪ FT Biogenética de Milho (Brazil) ▪ Phytogen (w/J.G. Boswell) ▪ Empresa Brasileira de Sementes (Brazil) 	In 1998, Mycogen, a biotech company, became a wholly-owned subsidiary of Dow Agrosciences. The company specializes in maize, sunflowers, soybeans, canola and alfalfa.
Dupont (USA)	<ul style="list-style-type: none"> ▪ Pioneer Hi-Bred Intl. (USA) ▪ Pioneer Argentina S.A. ▪ Pioneer Hi-Bred Australia Pty Ltd ▪ Pioneer Hi-Bred Services GmbH (Austria) ▪ Pioneer Hi-Bred Northern Europe (Belgium) ▪ Pioneer Sementes Ltda. (Brazil) ▪ Pioneer Semena Bulgaria ▪ Pioneer Hi-Bred Limited (Canada) ▪ Semillas Pioneer Chile Ltda. ▪ Shandong Denghai-PIONEER Seeds (China) ▪ DuPont de Colombia S.A. ▪ Pioneer Sjeme d.o.o. (Croatia) ▪ Pioneer Hi-Bred Services (Czech Rep.) ▪ Misr Pioneer Seed Company (Egypt) ▪ Pioneer Hi-Bred Seeds (Ethiopia) ▪ Pioneer Semences SAS (France) ▪ Pioneer Hi-Bred N. Europe (Germany) ▪ Pioneer Hi-Bred Hellas (Greece) ▪ Pioneer Hi-Bred Magyarország Kft. (Hungary) ▪ PHI Seeds Ltd. (India) ▪ PT DuPont Indonesia ▪ Pioneer Hi-Bred Italia ▪ Pioneer Hi-Bred Japan ▪ Farmchem Seedlinks Limited (Kenya) ▪ Chemicals & Marketing Co. (Malawi) ▪ PHI Mexico SA de CV ▪ Pioneer Hi-Bred N. Europe (Neth.) ▪ Genetic Technologies, Ltd. (New Zealand) ▪ Pioneer Pakistan Seed Ltd ▪ Melo & Cia, C.A. (Panama) ▪ Pioneer Hi-Bred Philippines ▪ Pioneer Hi-Bred Services GmbH (Poland) ▪ Pioneer Hi-Bred Sementes de Portugal ▪ Pioneer Hi-Bred Puerto Rico ▪ Pioneer Hi-Bred Seeds Agro (Romania) 	Dupont's Pioneer Hi-Bred lost its longstanding title as world's largest seed company in early 2005 when Monsanto purchased Seminis. Dupont now ranks number 2, with 2004 seed sales of \$2,600 million. Pioneer develops hybrids of corn, sorghum, sunflower and canola, and varieties of soybean, alfalfa and wheat for worldwide markets. The company has subsidiaries "on every crop-producing continent of the world."

Seed Company	Subsidiaries/Acquisitions	Comments
Dupont (continued)	<ul style="list-style-type: none"> ▪ Pioneer Semena Holding GmbH (Russia) ▪ Pioneer Hi-Bred Services (Serbia & Montenegro) ▪ Pioneer Hi-Bred Slovensko (Slovakia) ▪ Pioneer Hi-Bred Services (Slovenia) ▪ Pioneer Hi-Bred RSA (South Africa) ▪ South Korea O.M.C. ▪ Pioneer Hi-Bred Spain SL ▪ Bytrade Tanzania Limited ▪ Pioneer Hi-Bred (Thailand) Co. ▪ Pioneer Tohumculuk (Turkey) ▪ Pioneer Nasinnya Ukraine, LLC ▪ Pioneer Hi-Bred N. Europe (UK) ▪ Agar Cross Uruguay S.A ▪ Semillas Pioneer de Venezuela ▪ Farmchem Services Ltd. (Zambia) ▪ Pioneer Hi-Bred Zimbabwe 	
KWS AG (Germany)	<ul style="list-style-type: none"> ▪ AgReliant (joint venture with Limagrain) ▪ AgroMais ▪ APZ ▪ Betaseed ▪ CPB Twyford ▪ KWS ARGENTINA ▪ KWS AUSTRIA SAAT GMBH ▪ KWS BENELUX ▪ KWS CHILE ▪ KWS FRANCE ▪ KWS ITALIA ▪ KWS KLOSTERGUT WIEBRECHTSHAUSEN ▪ KWS MAIS FRANCE ▪ KWS MAIS GMBH ▪ KWS OSIVA s.r.o. ▪ KWS POLSKA ▪ KWS RAGT HYBRID KFT ▪ KWS RUS ▪ KWS SAAT AG ▪ KWS SCANDINAVIA AB ▪ KWS Semena Bulgaria EOOD ▪ KWS Semena d.o.o. ▪ KWS Semena s.r.o. ▪ KWS SEME YU ▪ KWS SEMILLAS IBERICA ▪ KWS Sjeme d.o.o. ▪ S.C. KWS Seminte S.R.L. ▪ KWS TÜRK ▪ KWS Ukraine T.O.W. ▪ Lochow-Petkus GmbH ▪ Lochow-Petkus Polska ▪ MOMONT ▪ Pan Tohum ▪ PLANTA ▪ Razès Hybrides ▪ SAKA-RAGIS ▪ Semena AG ▪ ZKW ▪ Producers Hybrid 	<p>KWS specializes in sugar beets, maize, cereals. Generates over 70% of its revenue outside Germany. 4th largest maize breeder in the US. With annual sales of US\$622 million in 2004, KWS is world's fifth largest seed company.</p>

Seed Company	Subsidiaries/Acquisitions	Comments
Landec Corp. (USA)	<ul style="list-style-type: none"> ▪ Landec Ag Inc. (USA) ▪ Heartland Seed 	US maize seed company. With the acquisition of Heartland Seed in 2005, the company's annual seed revenues are approximately \$34 million.
Land O Lakes (USA)	<ul style="list-style-type: none"> ▪ Croplan Genetics ▪ Hytest Seeds ▪ Agriliance (joint venture with CHS, Inc.) ▪ ABI Alfalfa ▪ Seed Research of Oregon ▪ Pickseed Companies Group ▪ Seeds Ohio ▪ Forage Genetics Inc. 	Land O' Lakes is a giant agribusiness cooperative with total sales of \$7,700 million. The company's 2004 seed sales were \$538 million, specializing in alfalfa, maize, soybeans and forage and turf grasses. About one-half of the seed sold by Land O'Lakes is purchased from Monsanto & Syngenta and then sold to coops.
Groupe Limagrain (France)	<ul style="list-style-type: none"> ▪ Vilmorin Clause & Cie ▪ Advanta BV (European field crop division) ▪ Force Limagrain (France) ▪ Limagrain (Bulgaria) ▪ Limagrain Cental Europe (France) ▪ Limagrain Ceska Rep (Czech Rep.) ▪ Limagrain Genetics (France) ▪ Limagrain (Italia) ▪ Limagrain Magyaroszag (Hungary) ▪ Limagrain Moldova ▪ Limagrain Nederland ▪ Limagrain Nickerson GmbH (Germany) ▪ Limagrain Polska (Poland) ▪ Limagrain Romania ▪ Limagrain Slovensko ▪ Limagrain Verneuil Holding ▪ Mais Angevin Nickerson (France) ▪ Nickerson UK ▪ Nickerson Intl. Research (France) ▪ Nickerson Sur (Spain) ▪ Soltis (France) ▪ Alliance Semillas (Chile) ▪ CHMT (South Africa) ▪ Clause Tezier Italia ▪ Clause Tezier do Brasil ▪ Clause UK ▪ Clause-Tezier Iberica (Spain) ▪ Clause Tezier (France) ▪ Clause ▪ CNOS Vilmorin (Poland) ▪ Ferry-Morse (US) ▪ Flora-Fey (Germany) ▪ Flora-Fey (Austria) ▪ Harris Moran ▪ Henderson ▪ Kyowa ▪ Marco Polo ▪ Niagra ▪ AgReliant Genetics (joint venture w/KWS) ▪ AgReliant Genetics US (joint venture w/KWS) ▪ Hazera Genetics ▪ Producers Hybrids (acquired by AgReliant) 	Limagrain is an independent cooperative and the European leader for maize and wheat seeds. Its subsidiary, Vilmorin Clause & Cie, is the world leader for home garden seeds (commercial). Limagrain's 2004 turnover for field seeds, vegetable seeds and garden seeds was approximately US\$1,044 million.
Monsanto (USA)	<ul style="list-style-type: none"> ▪ Seminis ▪ Emergent Genetics ▪ American Seeds Inc. ▪ Channel Bio Corp. ▪ Crow's Hybrid Corn 	Monsanto became the world's largest seed company in 2005 when it purchased Seminis – the world's largest vegetable seed business for \$1.4 billion. Though traditionally a

Seed Company	Subsidiaries/Acquisitions	Comments
Monsanto (continued)	<ul style="list-style-type: none"> ▪ Midwest Seed Genetics ▪ Wilson Seeds ▪ NC+Hybrids ▪ Advanta Canola Seeds ▪ Interstate Canola Seeds ▪ Asgrow (soybean & corn) ▪ Petoseed ▪ Bruinsma ▪ Holden's Foundation ▪ Jacob Hartz ▪ Hybritech ▪ Calgene ▪ Agracetus ▪ Plant Genetics Inc. ▪ Ameri-Can Pedigreed ▪ Monsoy (Brazil) ▪ First Line Seeds (Canada) ▪ Plant Breeding Intl. (UK) ▪ Agrocere (Brazil) ▪ Cargill's intl. seed division ▪ Dekalb Genetics (USA) ▪ Custom Farm Seed ▪ Sensako (South Africa) 	chemical company, Monsanto now earns more money from seeds and biotech traits than from its pesticide business. 2004 annual seed sales (including Seminis): US\$2,803 million.
Nidera Corporation (The Netherlands)	<ul style="list-style-type: none"> ▪ Nidera Semillas (Argentina) ▪ Nidera Sementes (Brazil) 	Nidera Seeds is a division within the privately-owned Nidera Corporation, a grain, oil seeds and oil processor company. Nidera started in the seed industry in 1988 with a program to improve sunflowers, and has expanded in crops such as corn, soybean, grain sorghum, forage sorghum, alfalfa and canola and wheat. In 2005, Nidera acquired Bayer's corn & soybean interests in Brazil. Annual turnover: approx. US\$80 million
Pannar Group (South Africa)	<ul style="list-style-type: none"> ▪ Pau Seeds USA (formerly owned by Bayer) ▪ Pannar Genetics, Inc. ▪ Kaystar Seed ▪ Pannar Seeds, Inc. (US) ▪ Kombat (South Africa) ▪ Starke Ayres (South Africa) ▪ Mascor (South Africa) ▪ Pannar Seed Kenya ▪ Pannar Seed Lda (Mozambique) ▪ Pannar Seed Z (Zambia) ▪ Pannar Seed BV (The Netherlands) 	Founded in 1958, privately-held Pannar Group is the largest seed firm in Africa, with subsidiary companies in several African countries, the EU, US and Argentina. Specializes in maize hybrids, sunflower, grains, pasture seed. The company does not publish or release turnover or profit figures.
Saaten-Union GmbH Ltd. (Germany)	<ul style="list-style-type: none"> ▪ Subsidiary companies in UK, Poland, France, Romania. ▪ Hybrinova (Dupont's hybrid wheat business) ▪ Monsanto's hybrid wheat business 	Specializes in hybrid wheat. 2004/05 annual sales for the German-based operations €134 million. The entire group had 04/05 turnover of approximately €155 million in 2004/05 (does not include sugar beet activity).
Sakata (Japan)	<ul style="list-style-type: none"> ▪ Sakata UK ▪ Sakata Ornamentals UK ▪ Sakata Holland ▪ Sakata Ornamentals Europe (Denmark) ▪ Frisa Planter (Denmark) ▪ Sakata Polska (Poland) ▪ Sakata Korea Co. ▪ Sakata Seed (Suzhou) China ▪ Sakata Siam Seed (Thailand) ▪ Sakata Seed Oceania ▪ Sakata Seed Corporation (India) ▪ Sakata Vegetables Europe (France) ▪ Sakata Middle East (Jordan) ▪ MayFord Seeds (South Africa) 	Founded in 1913, Sakata specializes in vegetable and flower seeds and ornamentals. The company has nine offices in Japan and subsidiaries worldwide. Annual seed sales: \$416 million (for year ending May 31, 2004).

Seed Company	Subsidiaries/Acquisitions	Comments
Sakata (continued)	<ul style="list-style-type: none"> ▪ Sakata Vegetics (South Africa) ▪ Sakata Seed Iberica (Spain) ▪ Alf Christianson Seed (USA) ▪ Sakata Seed America (USA) ▪ Sakata Seed de Mexico ▪ Sakata Seed de Guatemala ▪ Sakata Centroamerica (Costa Rica) ▪ Sakata Seed Sudamerica (Brazil) ▪ Sakata Seed Chile ▪ Sakata Ornamentals (Chile) 	
Seminis – majority owned by Fox Paine, a buyout firm <i>(sold in 2005)</i>	<ul style="list-style-type: none"> ▪ Asgrow Seed Co. ▪ Petoseed ▪ Royal Sluis ▪ Hungnong Seed Co. (S. Korea) ▪ Ang Seed Co. (S. Korea) ▪ Sementes Agroceres (vegetable seed division) ▪ Barham Seed 	Monsanto (see above) acquired Seminis, the world's largest producers of vegetable and fruit seeds, in January 2005 for \$1.4 billion.
Svalöf Weibull AB (Sweden)	<ul style="list-style-type: none"> ▪ Danisko Seeds ▪ SW Seed Canada ▪ Newfield Seeds (Canada) ▪ Riding Valley Agro (Canada) ▪ Promark Seed (Canada) ▪ Priority Lab Services (Canada) ▪ Wheat City Seed (Canada) 	SW is 60% owned by Lantmännen (the Swedish Farmers Supply and Crop Marketing Association) and 40% owned by BASF. The company specializes in cereals, oilseeds, forage crops. Annual sales: €116 million (2004)
Syngenta	<ul style="list-style-type: none"> ▪ Advanta BV (North American corn and soybean business – Garst brand) ▪ Northrup King (NK) ▪ Funk Seed Intl. ▪ Rogers Bros. ▪ Zaadunie BV (Neth.) ▪ McNair Seed ▪ Cokers Pedigreed ▪ Fredonia ▪ Hilleshog ▪ Agritrading ▪ CC Benoist ▪ Maisadour Semences ▪ Eridania Beghin-Soy ▪ Golden Harvest (6/04) ▪ Dia-Engei (Japan) 2/04 ▪ CHS Research LLC (04) ▪ GA21 (technology) (04) 	<p>Syngenta was formed in 2000 when Novartis merged with AstraZeneca's agribusiness.</p> <p>In 2004, 52% of Syngenta's seed sales came from field crops; 48% from vegetables and flowers. Annual seed sales: US\$1,239 million</p>
Takii and Co., Ltd. (Japan)	<ul style="list-style-type: none"> ▪ American Takii, Inc. ▪ CTT Seed Co. (Thailand) ▪ Qingdao Huang Long (China) ▪ T.W. Company (Hong Kong) ▪ Takii Chile ▪ Takii Europe (Netherlands) ▪ Takii France ▪ Takii Korea Co. ▪ Pahuja Takii Seed (India) ▪ Takii do Brasil 	Founded 1835 in Japan. Leading vegetable and flower seed company. Annual seed sales: \$366 million (for year ending April 2004).

Is Something Missing?

Given the pace of industry consolidation, we may be missing some important transactions. If you find that information is missing on the seed industry chart, or if something should be changed, kindly notify ETC Group, etc@etcgroup.org

¹ Source: Monsanto. For FY ended August 31, 2004.

² According to Limagrain, the company earned around 875 million euros from field, vegetable and garden seeds in 2004 (July 1, 2003-June 30, 2004). Using average historical currency exchange for the period, total 2003/04 seed sales were approximately US\$1,044 million. Personal communication with Jean-Claude Guillon, Corporate VP, Strategy and Communication for Limagrain.

³ KWS AG Letter to Shareholders, May 2005 reports that FY 2004/05 ends June 30, 2005. Sales are expected to be around Euro 488. Converted at exchange rate for the period (1.2745) the amount in US dollars is \$622 million

⁴ About one-half of the seed sold by Land O'Lakes is purchased from Monsanto & Syngenta and then sold to coops. As a result, some of these seed revenues are counted twice. Personal communication with seed division, Land O'Lakes.

⁵ As of May 31, 2004 (most recent information available), Sakata's annual turnover was 46,281 million Japanese Yen, or US\$415.6 million. See Sakata's English language corporate website.

⁶ According to email received from Norbert Lemken, Bayer CropScience, August 17, 2005 the company's total seed turnover for 2004 was €311 million. Based on calendar 2004 exchange rate, $1.24386 \times 311 = \text{\$}386.84$ million.

⁷ As of 4/30/04 Takii's annual turnover was 41,000 million Yen, or US\$366.5 million. See Takii's corporate global website.

⁸ Information provided by DLF-Trifolium, 8/24/05. For year ending May 31, 2004.

⁹ Source: International Seed Federation, Seed Statistics, on the Internet:

<http://worldseed.org/statistics.htm#TABLE%201>

¹⁰ Phillips McDougall, "Seed Industry Consolidation," July 2005. Unpublished report. Phillips McDougall estimates the value of the commercial seed market to be US\$19,000 million.

¹¹ According to ISAAA, 200 million acres were planted in GM crops. According to Monsanto, its biotech trait acreage covered 175.7 million acres in 2004.

¹² Source: Monsanto, "Monsanto Biotechnology Trait Acreage: Fiscal Years 1996 to 2004," www.monsanto.com

¹³ Source: Monsanto, "Seminis. Acquisition, Investor Conference Call," Jan. 24, 2005.

www.monsanto.com/monsanto/content/investor/financial/presentations/2005/01-24-05_low.pdf

¹⁴ Jorge Fernandez-Cornejo and David Schimmelpfennig, "Have Seed Industry Changes Affected Research Effort?" Amber Waves, USDA Economic Research Service, February 2004. On the Internet:

<http://www.ers.usda.gov/AmberWaves/February04/Features/HaveSeed.htm>

¹⁵ Ibid.

¹⁶ You can track the number of biotech acres being planted and harvested on a daily basis here:

<http://www.truthabouttrade.org/article.asp?id=3744>

¹⁷ Ken Belcher, James Nolan, Peter W.B. Phillips, "Genetically modified crops and agricultural landscapes: spatial patterns of contamination," *Ecological Economics* 53 (2005) 387-401.

¹⁸ Delta & Pine Land, "Technology Protection System: Providing the Potential to Enhance Biosafety and Biodiversity in Production Agriculture," a brochure distributed by D&PL in February 2005 at a United Nations meeting in Bangkok.

¹⁹ GRAIN, *Seedling*, July 2005. <http://www.grain.org/seedling/?type=45>

²⁰ Charles M. Benbrook, "Genetically Engineered Crops and Pesticide Use in the United States: The First Nine Years." Biotech InfoNet, Technical Paper Number 7, October 2004.

²¹ Pesticide Action Network Updates Service, "Rethinking RoundUp," August 5, 2005. See also: Sophie Richard, Safa Moslemi, Herbert Sipahutar, Nora Benachour, and Gilles-Eric Seralini, *Environmental Health Perspectives*, Vol. 113, No. 6 June 2005, <http://ehp.niehs.nih.gov/members/2005/7728/7728.html>; Rick A. Relyea, "The Impact of Insecticides and Herbicides on the Biodiversity and Productivity of Aquatic Communities,"

Ecological Applications, v.15, n.2, 1 April 2005 <http://www.mindfully.org/Pesticide/2005/Roundup-Aquatic-Communities1apr05.htm>