NAGOYA PROTOCOL: ECONOMICS AND TRADE

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UNCTAD Expert Peer Review Meeting on the Nagoya Protocol and BioTrade

Convention on Biological Diversity & Nagoya Protocol

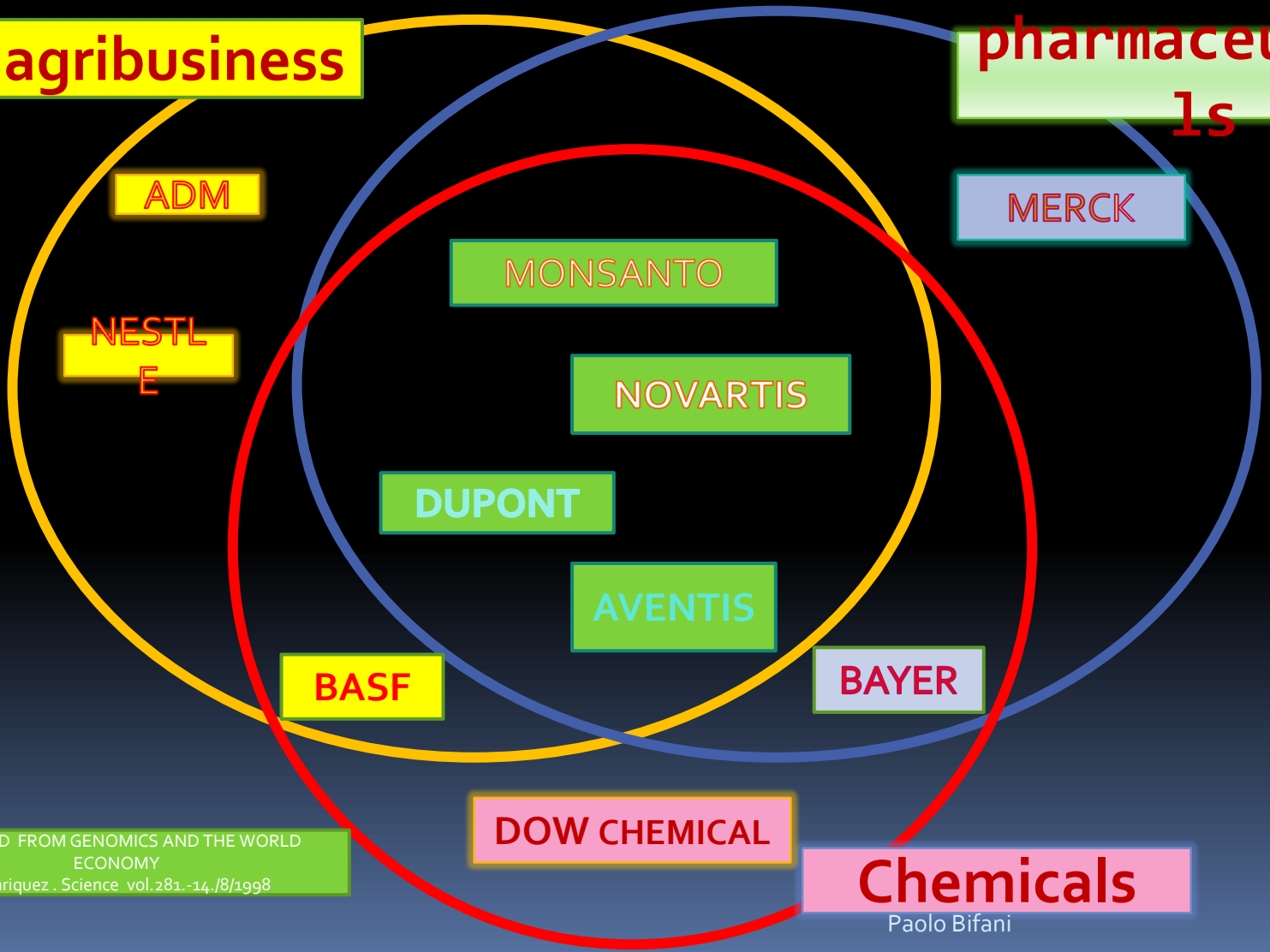
1992: The objectives of this Convention [...] are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources [...]

2010: The objective of this Protocol is the fair and equitable sharing of the benefits arising from the utilization of genetic resources, including by appropriate access to genetic resources [...]

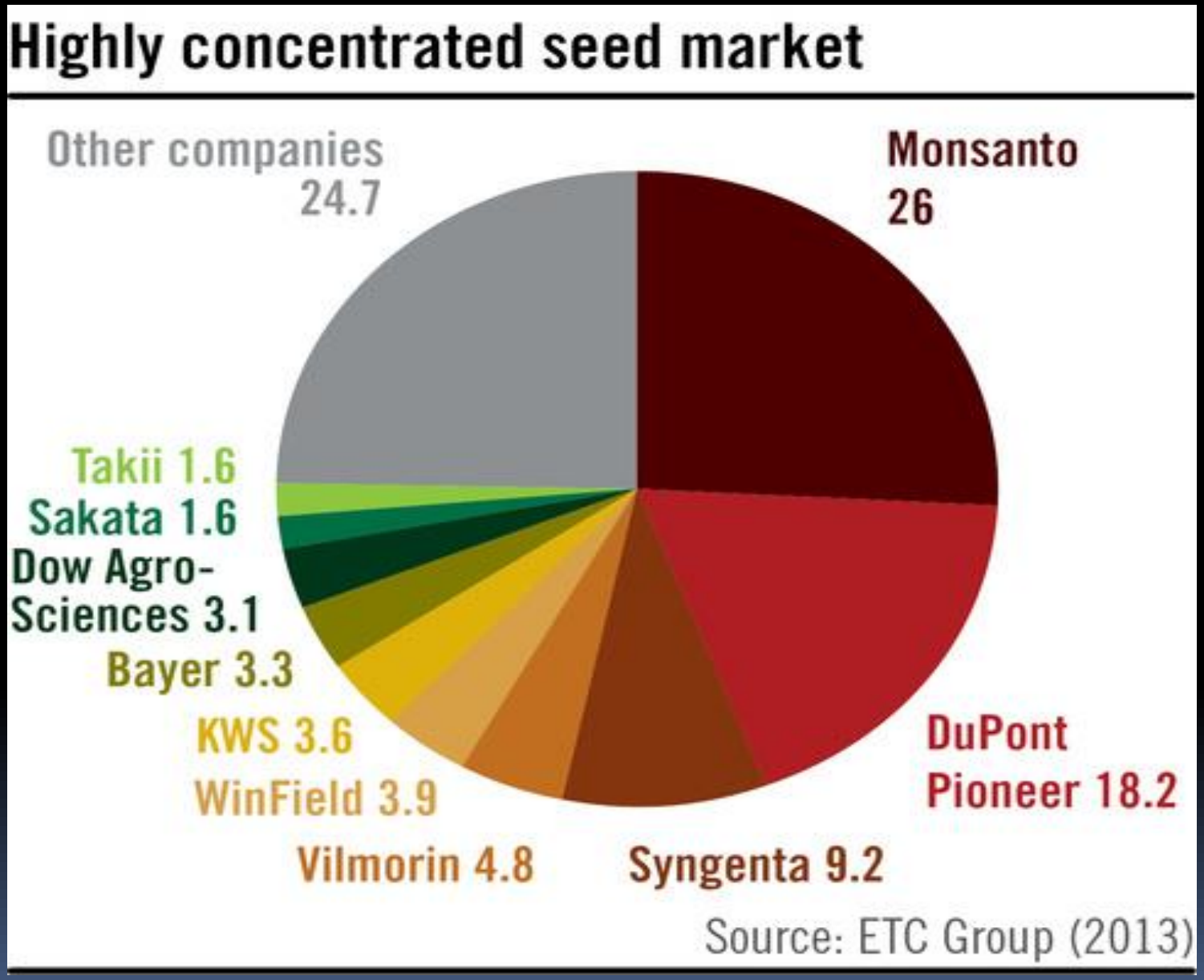
SOME UNDERLYING QUESTIONS CONCERNING ECONOMIC AND TRADE ASPECTS OF THE NAGOYA PROTOCOL

1. - who are the main actors exchanging genetic resources?
2. - which are the actual and potential markets for genetic resources?
3. - which are the value of genetic resources and how are they determined or calculated?
4. - what are the pathway for the exchange of genetic resources and how they are characterized?
5. - how current regulations and institutional constraints affect the exchange of the genetic resources?
6. - in what ways might the Protocol affect current practices?
7. - what insights can be gained to further inform the NP implementation process?
8. - Does existing practices conform or would need to change in response to the Nagoya Protocol?

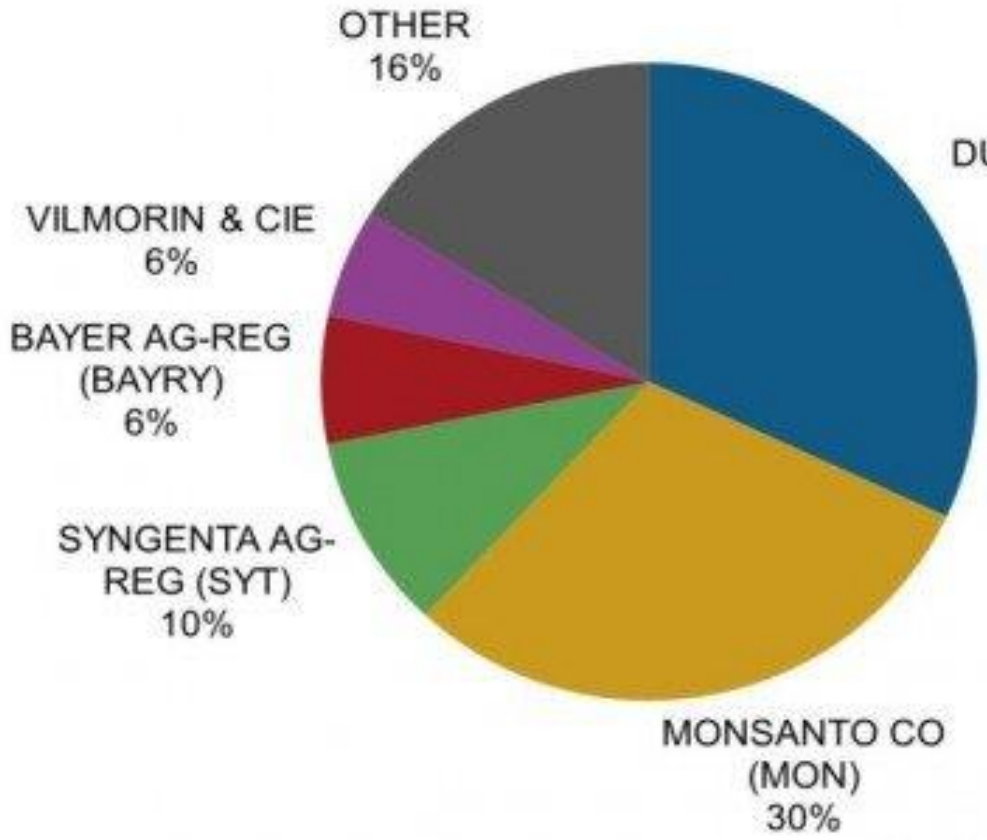
LIFE SCIENCE INDUSTRY



ADAPTED FROM GENOMICS AND THE WORLD ECONOMY
j.Henriquez . Science vol.281.-14./8/1998


Highly concentrated seed market
Other companies 24.7
Monsanto 26
Takii 1.6
Sakata 1.6
Dow Agro-Sciences 3.1
Bayer 3.3
KWS 3.6
WinField 3.9
Vilmorin 4.8
Syngenta 9.2
DuPont Pioneer 18.2
Source: ETC Group (2013)

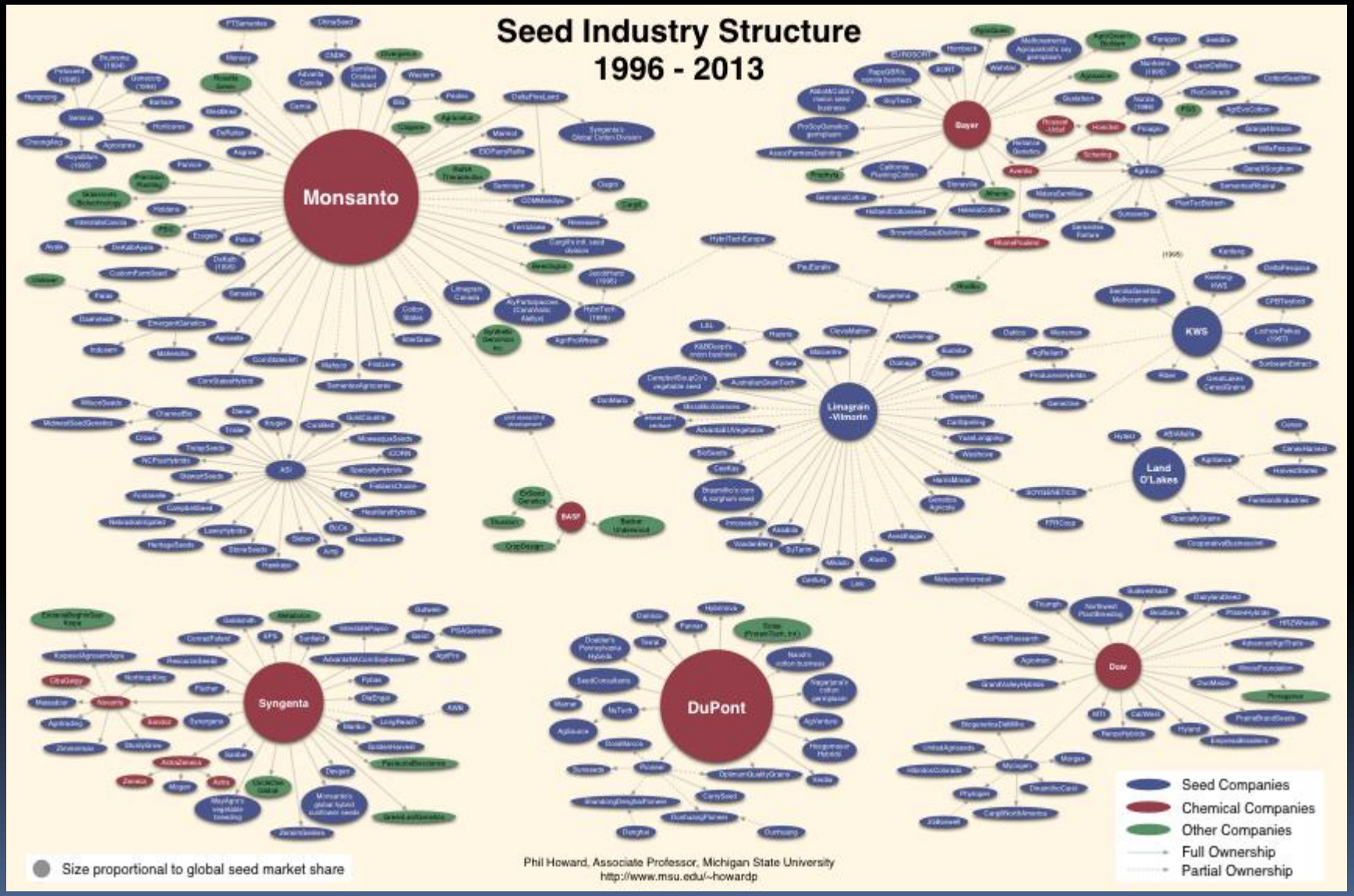
Seed Industry Market Share (Revenue)



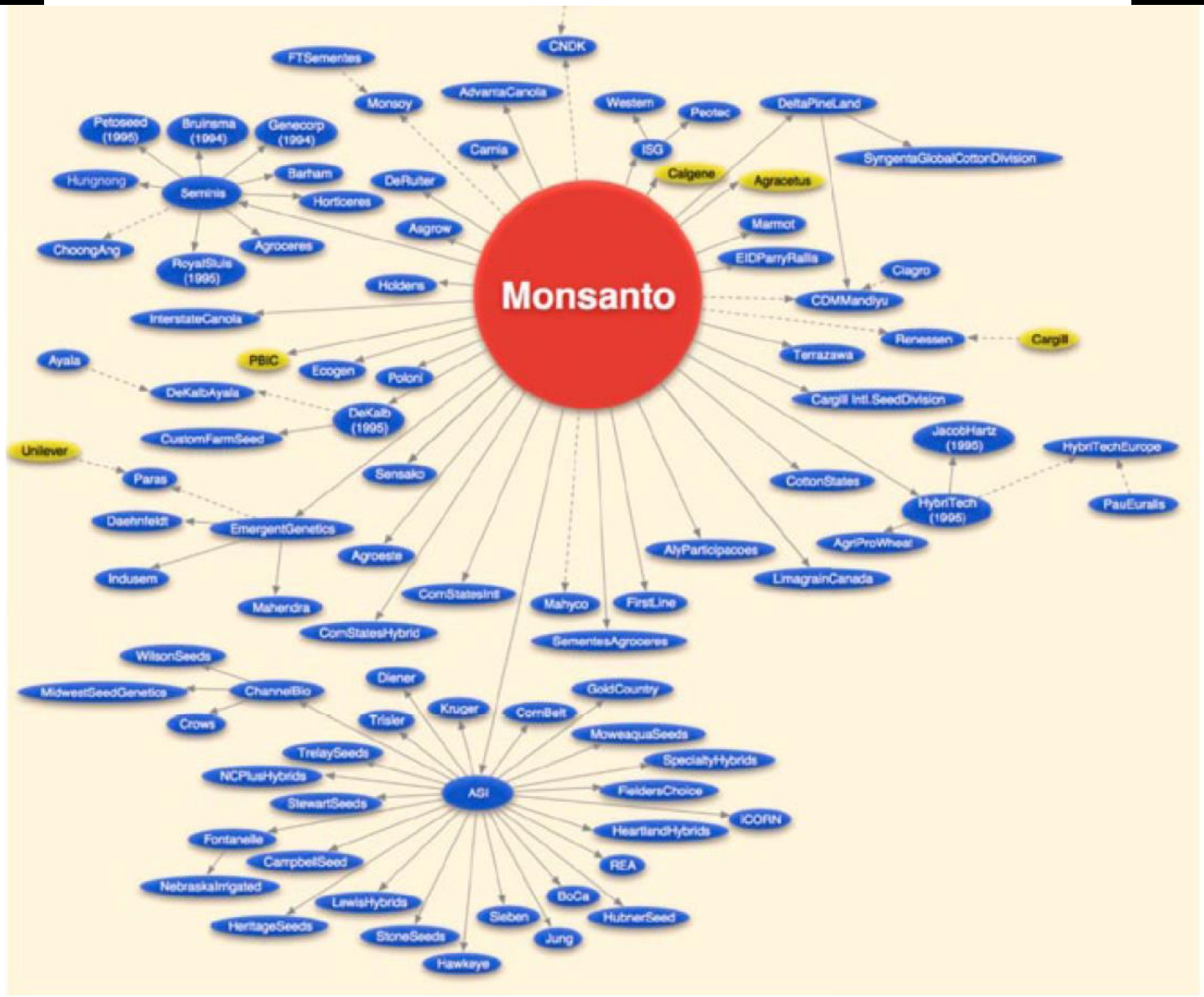
Companies in the other category each do not make up more than 5% of total revenue

Market Realist

Source: 2012 Financial Reports


Seed Industry Structure
1996 - 2013
Monsanto
Bayer
Limagrain
-Vilmorin
KWS
Land
O'Lakes
Syngenta
DuPont
Dow
BASF
Seed Companies
Chemical Companies
Other Companies
Full Ownership
Partial Ownership
Size proportional to global seed market share
Phil Howard, Associate Professor, Michigan State University
http://www.msu.edu/~howardp

Network of companies owned by Monsanto.



(source: Howard, 2009).

MONSANTO BY THE NUMBERS

11,000 Estimated Patents

$2.6 million
spent per day on research

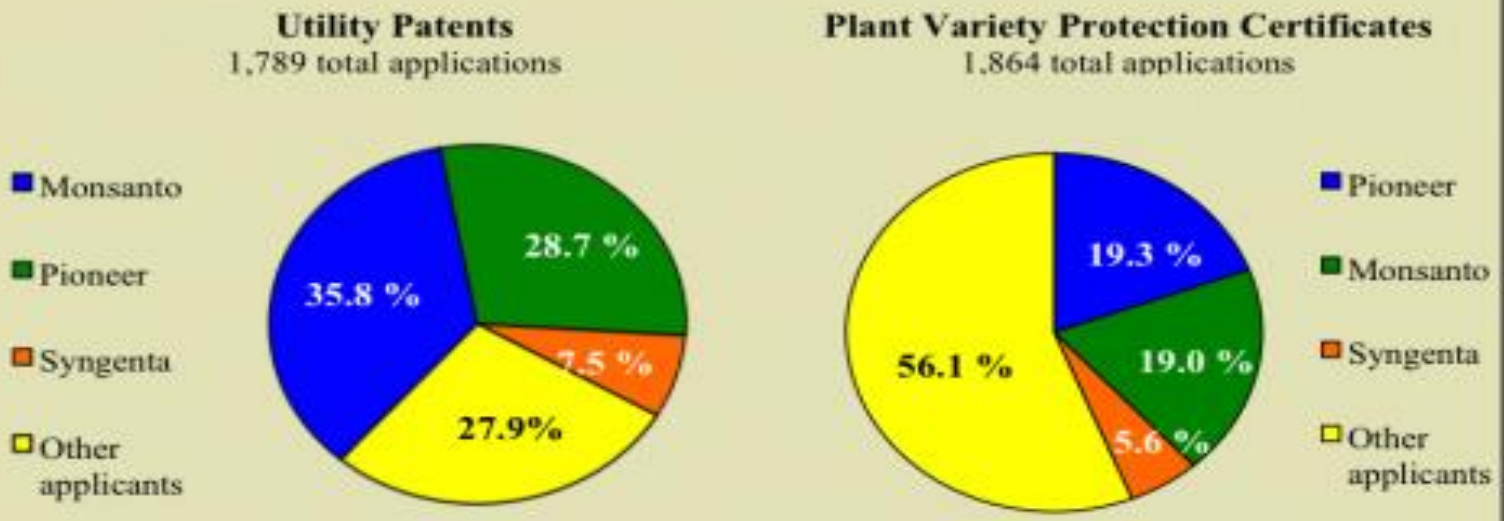
250,000 American customers

$126 million
in profits 2012

Source: Monsanto Company
Wall Street Journal

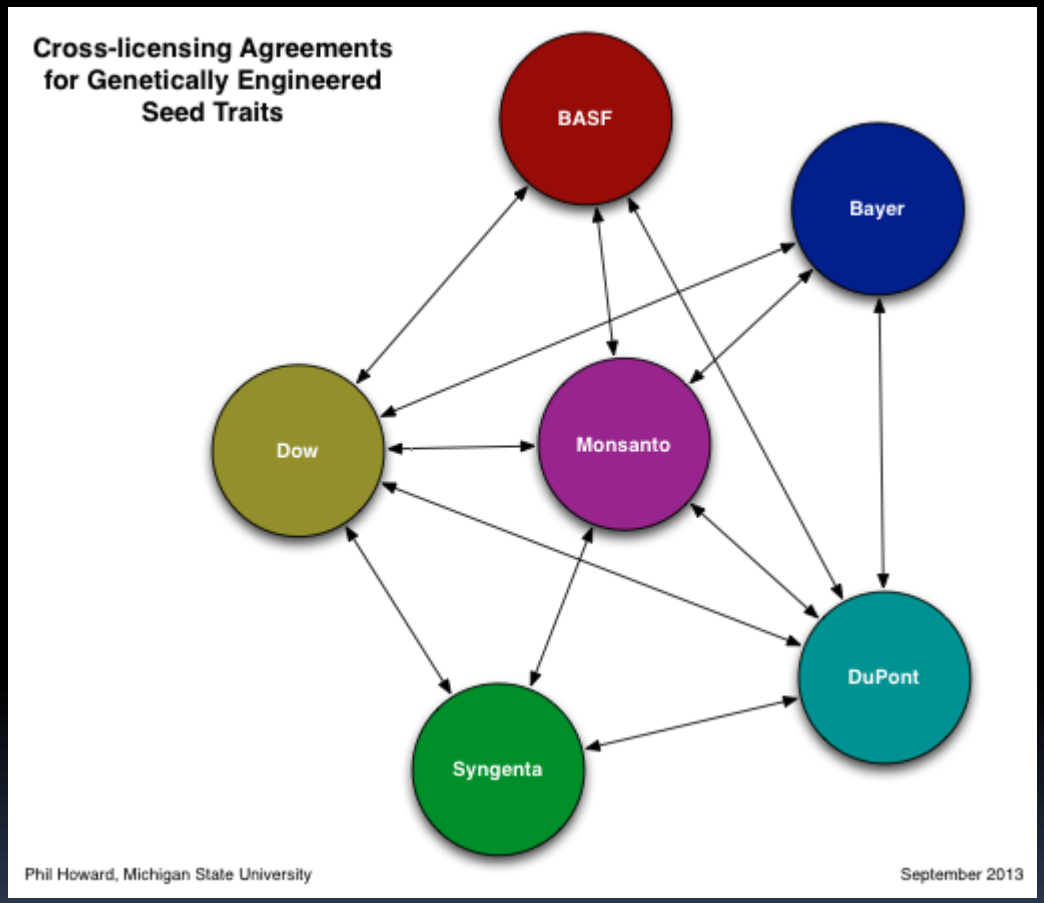
US Applications for Intellectual Property Protection on Plant Varieties

2004-2008



Between 2004 - 2008, three Gene Giants accounted for 72% of all US utility patent applications on plant varieties; the same three firms accounted for 44% of the applications for plant variety protection (PVP) certificates.

Source: ETC Group, adapted from Pardey et al., *Nature Biotechnology*, January 2013, Table 1, p. 28.


Cross-licensing Agreements for Genetically Engineered Seed Traits
BASF
Bayer
Dow
Monsanto
DuPont
Syngenta
Phil Howard, Michigan State University
September 2013

GENETIC DIVERSITY . GENETIC CONTRIBUTIONS OF CULTIVARS TO CROP YIELDS

CROP	LOC.	PERIOD	EFFECT ON PRODUCTION
ALL CROPS	USA	1980s	US$ 1.0 billion/year (OTA 1987;USDA)
MAIZE	USA	1930/80	½ of a fourfold increase in yields. (OTA 1987)
	USA	1930/80	89% of yield gain of 103kg/ha/year (Duvik, 1984)
	USA	1930/80	71% of yield gains in single cross hybrids (Duvik 1984)
	USA	1985/89	Genetic gains to N. Dakota of US$2.3 million/year (Frohberg 1991)
RICE	ASIA		US$ 1.5 billion/year (Walgate)
	USA	1930/80	≈ of a doubling in yields. (OTA 1987)
WHEAT	ASIA		US$ 2.0 billion/year
	USA	1930/80	≈ 1/2 of a doubling in yields. (OTA 1987)
	USA	1958/80	0.74 genetic gain per year ½ of 32% yield gain (SCHMIDT 1984)
SUGAR	USA	1930/80	≈ 1/2 of a doubling in yields (OTA 1987)

GENETIC DIVERSITY: SPCIFIC CONTRIBUTION MADE BY WILD RELATIVES OF CROPS

CROP	FOUND IN	EFFECT ON PRODUCTION
WHEAT	TURKEY	Genetic resistance to disease valued at US$50 million/year. (Witt, 1985)
RICE	INDIA	Wild strain proved resisteant to the grassy stunt virus
BARLEY	ETHIOPIA	Protect California's US$160 million/year crop from yellow dwarf virus. (Witt, 1985)
BEANS	MEXICO	CIAT used genes from Mexican Bean to beat the Mexican been weevil which destroys as much as 25% of stored beans in Africa and 15% in South America.(Rhoades, 1991)
GRAPES	TEXAS	Texas rootstock (from land now covered by the Dallas –Fort Wporth Airport) was uses to revitalize the eiropean wine industry in the 1860 after a louse infection. (Rhoades 1991)

GENETIC DIVERSITY . GENETIC CONTRIBUTIONS OF CULTIVARS TO CROP YIELDS

CROP	LOC.	PERIOD	EFFECT ON PRODUCTION
WHEAT	UK	1947/75	50% of an 84% gain in yields (Silvey 1978)
	WORLD	1970/83	43% of genetic gain totalling 46% (best data) (Kuhr et al. 1985)
			55% of genetic gains totalling 32% (all sites) (Kuhr et al. 1985)
SORGHUM	USA	1930/80	≈1/2 of fourfold increase in yields (OTA 1987)
		1950/80	1-2% genetic gain /year from manipulating kernel numbers, plant weight, height and leaf area (Miller and Kebede 1984)
BARLEY	USA	1930/80	≈ 1/2 of a doubling in yields (OTA 1987)
POTATO	USA	1930/80	≈1/2 of fourfold increase in yields (OTA 1987)
SOYBEANS	USA	1930/80	≈ 1/2 of a doubling in yields (OTA 1987)
	USA	1902/77	79% of 23.7 kg/ha annual yield gains (Specht&Williams 1984)
PEARL MILLET	INDIA	1990	genetic improvement worth us$200 million/year (ICRISAT 1990)
COTTON	USA	1930/80	≈ 1/2 of a doubling in yields (OTA 1987)
		1910/80	0.75% genetic gain per year (Meredith, Jr & Bridge 1984)

Contribution of Genetic Resources to Medicinal Products

Vin cristine and vinblastine (Henne 1998)	**US$ 100 million per year**
42% of 25 best selling drugs world wide (Ten Kate and Laird 2000)	US$ 17.5billion

FOREIGN GERMPLASM CONTRIBUTION TO MAIZ AND SOJA BEEN CULTIVTED IN THE USA

US$ 10.2 **BILLIONS PER YEAR**

US Secretary of State Warren Christopher. Letter to the US Congress dated 16.08.1994 requesting the ratification of the CBD by the USA

PROPORTION OF CLOSE SOURCES IN OBTAINING GENETIC RESOURCES		
	DOMESTIC EXCHANGE	INTERNATIONAL EXCHANGE
From friends and colleagues in any sector	96%	93%
-in government	58%	41%
-in university	76%	72%
-in industry	42%	16%

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PROPORTION OF RESEARCH PROJECTS WITH EXPECTED BUT NOT FORMALIZED NON-MONETARY COMPENSATION

	ALL PROJECTS	FUNDED BY INDUSTRY	WITH INTERNATIONAL SOURCE	WITH MTA
Provide any non-monetary payments	68%	66%	74%	80%
Storage of materials	16%	8%	23%	15%
Research or technical services	24%	24%	34%	30%
Information on project results	59%	59%	62%	70%
Education or training	15%	13%	18%	13%

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PROPORTION OF RESPONDENTS INDICATING PRIOR USE OF MTAs

	Domestic exchange		International exchange	
Percentage of respondents who use MTAs	31%	40%	36%	31%
-when partners are gene banks	29%	35%	37%	29%
-when partners are government employees	48%	47%	53%	38%
-when partners are university employees	48%	56%	52%	52%
-when partners are companies	37%	51%	45%	34%

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