

Application of PVP and Patent Information to Understand Composition and Diversity of Maize Germplasm

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Registration of dent corn inbreds through U.S. Plant Variety Protection (PVP) and utility patent offer opportunities to understand the breadth of commercial germplasm. Enabling insight into pedigree background, phenotypic characteristics, and genetic diversity. The ultimate practical take-home is ultimately the opportunity to acquire this germplasm upon expiration of applicable PVP and/or utility patent protection. Through mergers and acquisitions most current registered germplasm is from a handful of sources. After summarizing across all programs, we will drill into the germplasm composition of the two largest programs Pioneer Hi-Bred (PHI) and Monsanto and its subsidiaries. Their combined germplasm constitutes approximately 85% of the registered corn germplasm and similarly a large market share of the U.S. corn acreage.

The fate over time of the 3 progenitors, the public lines B73 (Stiff Stalk family) and Mo17 (Lancaster), and PHI PH207 (Iodent) are indicative of macro changes in composition of germplasm over the past 3 decades. The contribution of B73 is stable, and inclusive in the composition of all proprietary programs, Mo17 use has dramatically declined, and Iodent germplasm has increased to the point of essentially replacing Mo17 germplasm as the non-Stiff Stalk component in contemporary commercial hybrid formulas. The source of Iodent germplasm is PH207, which was bred extensively within PHI and through breeding of PHI hybrids in the 1980s into PHI competitor germplasm across programs. The genetic contribution of B73 and PH207 to contemporary (2000-present) germplasm across programs is 12% and 10%, respectively.

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Origin of PVP/patent registered cultivars 1980-present

Company	#
Monsanto	709
PHI	478
Syngenta	118
DAS	27
AgReliant	9
FFR	4
Lifaco	3
Public	2
IFSI	1
MAISADOUR	1
Quality Research	1
Rustica Semences	1
	1354

**Inbreds registered via PVP/patent
per decade**

Decade	# inbreds
1980	139
1990	509
2000+	706
	1354

Progenitor genetic contribution

Progenitor	% Genetic Contribution				
	1985-1999*	1990-1994	1995-1999	2000-2004	2005-Pres
Mo17	7	5	4	2	2
B73	11	11	13	12	12
B14	6	6	4	3	3
B37	2	4	4	3	2
PHG39	3	3	4	4	4
PH595	3	1	2	2	1
PH207	10	7	9	9	10
Oh43	1	3	3	3	4

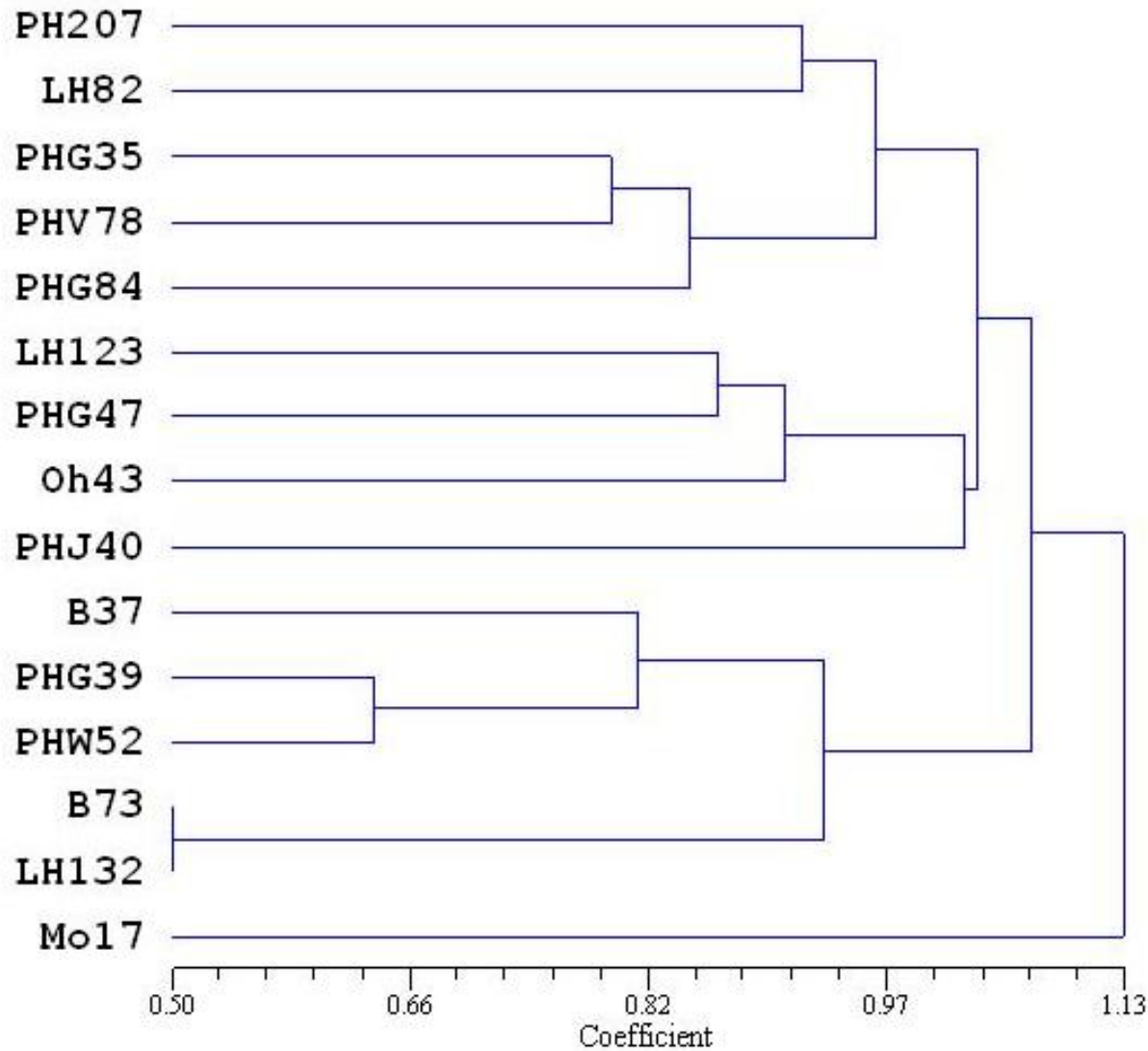
*Number PVP/patent progeny registered: 1985-1989 (119 inbreds), 1990-1994 (195), 1995-1999 (314), 2000-2004 (239), and 2005-Present (467).

Derived progeny with > 25% genetic contribution from progenitor

Progenitor	% Progeny > 25% genetic contribution				
	1985-1999	1990-1994	1995-1999	2000-2004	2005-Pres
Mo17	10	10	7	4	2
B73	20	23	26	23	22
B14	11	9	6	3	1
B37	4	7	5	2	0
PHG39	4	8	12	10	10
PH595	8	3	4	2	0
PH207	23	19	18	18	16
Oh43	4	3	2	1	0

*Number PVP/patent progeny registered: 1985-1989 (119 inbreds), 1990-1994 (195), 1995-1999 (314), 2000-2004 (239), and 2005-Present (467).

Genetic distance (49,102 SNPs) of progenitors across programs



Discussion of Pioneer Hi-Bred Germplasm

Breaking PHI Heterotic Families to Core Lineages

Discussion of Monsanto (Dekalb, Holdens, Asgrow) Germplasm

Breaking Monsanto Heterotic Families to Core Lineages

Examples of Introduction of Exotic Germplasm into Commercial Corn Germplasm