Science Societies

Initial employment of plant breeding Ph.D. graduates, 2015–2020

By the Plant Breeding Coordinating Committee

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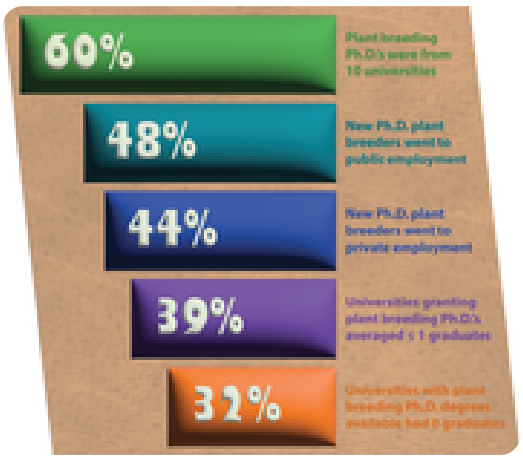
Photo courtesy of Amo Aduragbemi.

A survey was conducted in 2021 to determine the initial job placement of new plant breeding Ph.D. graduates. The primary objective was to determine the distribution of new graduates accepting employment in private industry vs. the public sector. Briefly a request was distributed initially to “agronomy and horticultural” department heads at 1862 Land Grant Universities (LGU), 1890 LGU, and other universities that grant

graduate degrees pertaining to plant breeding. A total of 120 departments at 87 universities were contacted. Of those, 68 responded with 53 having a Ph.D. degree in plant breeding (or a generic name with a plant breeding emphasis) and 36 of the 53 having awarded Ph.D. degrees in plant breeding during the five-year time frame of the survey, academic year (AY) 2015–2016 through AY 2019–2020.

A total of 477 Ph.D. degrees were awarded by these 36 universities during this time frame with 210 accepting employment in private industry, 228 accepting employment in the public sector, and 39 either unknown or not having employment at the time of graduation. Note that post-doc positions were to be identified as public sector since most, if not all, would be at universities or with USDA-ARS. Thus, 44% of the new Ph.D. plant breeders went to private industry, 48% went to public employment, and 8% were either unknown or unemployed at graduation. There was no attempt to determine if the graduates entered the workforce in a plant breeding position or in a related position.

Value Recognized, but with Unequal Education Distribution



Concern has been expressed for several years that LGU and other agricultural universities were not replacing retiring plant breeders. However, these data suggest that U.S. universities do recognize the value of plant breeders in educating the next generation in this cornerstone arena of American agriculture and in cultivar/germplasm development. It must be noted, however, that the definition of plant breeder is evolving; today it includes not only the traditional phenotypic plant

breeders who utilize Mendelian principles and classical genetics in crop improvement, but also molecular geneticists whose contributions extend the profession of plant breeding into genomics, genotyping, gene editing, etc. The advent of high-throughput phenotyping, artificial intelligence, and drone technology will further expand the areas of expertise that will fit under the umbrella of plant breeding.

The data also suggests that university education in plant breeding is not equally distributed across these universities. The 10 universities producing the most Ph.D. plant breeding graduates produced 60% of all Ph.D.'s (288 of 477—Table 1) while 17 of the 53 institutions with a Ph.D. plant breeding degree available graduated no Ph.D.'s in plant breeding during the five-year time frame. Fourteen of the 36 universities granting plant breeding Ph.D.'s averaged one or fewer Ph.D. plant breeding graduates per year from AY 2015–2016 through AY 2019–2020. If one assumes that universities that graduated several plant breeding Ph.D.'s had more plant breeding teaching faculty than universities that graduated none or few Ph.D.'s in this survey, then one could assume that the subject matter breadth and depth of plant breeding courses vary considerably across the United States. The PBCC continues to explore ways to share teaching expertise across universities.

University	Total private	Total public	Total unemployed or unknown	Grand total	Percent to private	Percent to public	Percent unemployed
					%		
University of Wisconsin	20	27	0	47	42.6	57.4	0.0
University of Illinois	23	16	0	39	59.0	41.0	0.0
University of Georgia	14	11	6	31	45.2	35.5	19.4
Texas A&M University	13	14	1	28	46.4	50.0	3.6
Iowa State University	19	8	0	27	70.4	29.6	0.0
Cornell University	12	14	0	26	46.2	53.8	0.0
University of Minnesota	16	10	0	26	61.5	38.5	0.0
University of Florida	12	11	0	23	52.2	47.8	0.0
North Carolina State University	10	9	3	22	45.5	40.9	13.6
Washington State University	8	1	10	19	42.1	5.3	52.6

Table 1. *Placement in public or private employment of new Ph.D. graduates among the top 10 universities granting Ph.D. degrees in Plant Breeding (or related degree with emphasis) for academic years 2015–2016 through 2019–2020.*

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