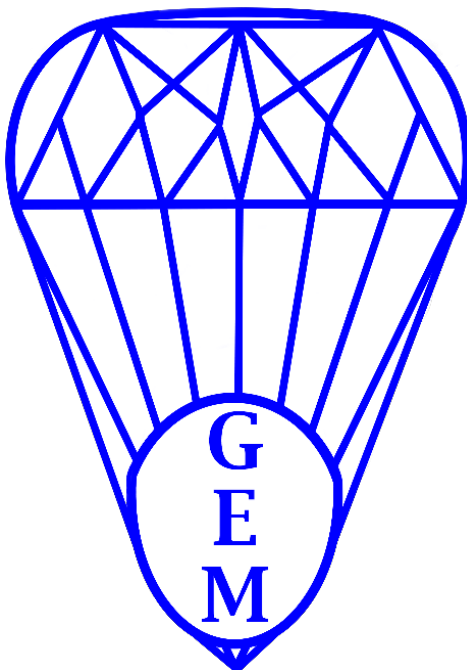


United States Department of Agriculture

Agricultural Research Service



Germplasm Enhancement of Maize

2024 GEM Cooperator Handout

December 10, 2024

The information in this report is shared cooperatively.

The data are not published, but are presented with the understanding that they will not be used in publications without specific consent of the public cooperator.

Germplasm Enhancement of Maize

Mission Statement:

The mission of GEM (Germplasm Enhancement of Maize) Project is to effectively increase the diversity of U.S. maize germplasm utilized by producers, global end-users, and consumers. The mission will be achieved through a collaborative effort between USDA-ARS, and both public and private research scientists by utilizing exotic, public, and proprietary maize germplasm. The resulting germplasm and associated knowledge, derived via the identification and incorporation of favorable alleles for prioritized traits from exotic sources, is utilized in private and public breeding programs and ultimately contributes to increased genetic diversity of maize grown by producers and improved product performance. In addition, the GEM Project provides opportunities for training plant scientists in the enhancement and utilization of unadapted germplasm. This contributes to the global sustainability of agricultural production, economic stability, and the nutrition and well-being of society.

2024 GEM Cooperator Meeting Booklet

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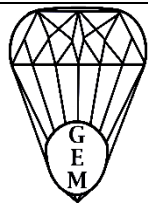
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Germplasm Enhancement of Maize

Cooperator Meeting

Date: Tuesday, December 10, 2024

Time: 13:30 to 17:00 EST

Place: Hyatt Regency Orlando

Room: Barrel Spring I

Virtual: Microsoft Teams Meeting

Meeting called by: J. Parks, Chair

Note taker: C. Turnbull

Agenda Topics

Call to Order and Welcome	J. Parks	13:30 – 13:40
Minutes of 5 December 2023	J. Parks	13:40 – 13:45
TSG Election Updates	Led by J. Parks	13:45 – 14:15
New GEM Releases	M. Krakowsky, A. Vanous	14:15 – 14:35
GEM Program Annual Report – Raleigh	M. Krakowsky	14:35 – 14:55
GEM Program Annual Report – Ames	A. Vanous	14:55 – 15:15
Break	All	15:15 – 15:25
In-Kind Support Summary	M. Krakowsky, A. Vanous	15:25 – 15:30
Genomic Prediction update – Bayer	C. Turnbull	15:30 – 15:40
GEM Website	F. Whitehead	15:40 – 16:00
Suggestions from Cooperators	All	16:00 – 16:15
Adjourn		~16:15

Minutes

GEM Cooperator Meeting – 5 December 2023

Note taker: Stephen Swarm

1. Jim Parks called meeting to order at 1:35 PM EST
2. Approved minutes for 2022 Cooperator meeting; Clint Turnbull motioned to accept the minutes and Robert Beiriger seconded
3. Reviewed TSG proposed membership changes
 - a. Azzeddine Douiyssi (AgReliant) ending membership, Tim Cupka replacing
 - b. Clint Turnbull ending 2nd term and remaining for 3rd term (pending cooperator approval)
 - c. Mitchell Schumann (Syngenta) ending 1st term and continuing 2nd term
 - d. Spencer Smith left USDA and TSG—Dan Jeffers replacing
 - e. Jianming Yu (ISU) ended 2nd term and Jinliang Yang (UNL) replacing
4. Introduced Tim Cupka, who is nominated to replace Azzeddine. Discussed motion to extend Clint's membership for a 3rd term considering the amount of turnover this cycle and his contribution to important active projects. Introduced Jinliang Yang (replacing Jianming Yu) associate professor from UNL; and Dan Jeffers (replacing Spencer Smith) a plant pathologist with USDA at Miss State. Jinliang and Dan gave brief introductions of their research work
 - a. Conducted a vote on proposed membership changes listed above. All proposed changes were approved by the cooperator vote
5. Jim presented the ability to add another small company member to the TSG to meet the 7-company max in bylaws. Jinliang discussed possibility of adding a seed-coating company or phenotyping company.
6. Program summaries
 - a. Raleigh—Matt: added Kaitlin Tallarida as a 2nd technician, to work on pathology. Summarized populations in development from the 2023 summer nursery, both quantity and composition of crosses. Contracted 4,000 ICB rows with Grow Alliance using 5 testers (increase from 2000 last year). About 11,000 YT plots, with 5,000 of those from cooperators (3 public, 3 private). Started cooperation in 2022 with NC OVT (Official Variety Testing), which adds 4 locations. From the recent budget increase, in FY23 expanded contract ICB and nursery rows, added second technician, bulk sheller, and new

equipment building. In FY24, looking to purchase new 36"-row header, trailer, truck, improve shelling operation, and possibly new cooling units and tractor.

- b. Ames—Adam: conducted 3,442 pollinated rows and 2,230 observation rows in nursery. DH line project—8 GEM parent cross for one SS pop (787 DH) and one NSS pop (1,064 DH), with Corteva working on genotyping DHs. Summarized types of populations in development. Maximum Production Genetics (MPG) donated F1 crosses with two proprietary inbreds. Summarized nursery work being conducted by cooperators, including development of early-gen families and disease screening. Conducted 10,880 YT plots (decreased numbers by using genomic selection in first year trials).

7. New releases

a. Ames

- i. GEMS-0334: La Posta Seq C7 F71-1-1-1-2/40a//R3212Z-060-001-001-B
- ii. GEMS-0335: PHHB4/KS23-6//2FACC-139-001-001-B
- iii. GEMS-0336: PHHB9//KS23-6/PHW52-139-001-001-B

b. Raleigh

- i. GEMS-0330: (GEMS-0050/CLG1501:S17b-B-020)-003-01-B
 - 1. Error in book, testers should be MBS8731 and MBS6717
- ii. GEMN-0331: (GEMN-0135/GEMN-0137)-002-02
- iii. GEMS-0332: GEMS-0227/42T1-B05-02
- iv. GEMS-0333: GEMS-0227/42T2-B44-01

8. In-kind support summary

- a. Raleigh—Matt: 7 public and private cooperators; Corteva: 7 locations of testing with 2,500 plots; Bayer: 2 locations of testing with 1,000 plots, and nursery, ICB, and genotyping work; AgReliant: 1 location of testing with 208 plots; Univ Tenn: 1 location with 224 plots, USDA Ames: 6 locations with 540 plots; USDA Starkville: aflatoxin and YT 232 plots; USDA Tifton: fall armyworm and corn earworm evaluations
- b. Ames—Adam: disease screening by Wyffels, USDA, Corteva, and Bayer; YT with Wyffels, Syngenta, KMR, DKD Genetics, Corteva, Becks, Bayer, AgReliant; genotyping from Corteva, Bayer; nursery support from Terrell Seed Research, Renk, MPG (along with germplasm donation), DKD Genetics, Corteva, Bayer, AgReliant.

9. GEM website update—Dave Peters

- a. Website is being hosted by USDA and is a standalone website. The site has successfully gone through Section 508 compliance. Website framework has been established.

Presented the overall outline of the website structure. Covered which features of the website are currently active and what is under development.

- b. <https://www.ars.usda.gov/germplasm-enhancement-of-maize>
- c. David Peters will be retiring from USDA as of Jan 12, 2024

10. Genomic Prediction update from Bayer—Jordi Vila

- a. The GEM genomic prediction projects contributed by Bayer have been published in three papers: Ana Rogers (2022), Efraim Contreras (2023), and Jordi Vila (2023)
- b. Presented the methods and results of the Contreras (2023) paper. This analysed the Ames genomic prediction project. It utilized material in testing from 2016-2022. Calculated genetic variance, heritability, and prediction accuracy of the GEBVs. The paper also analysed the change in genetic variance and heterozygosity over time of the material genotyped.
- c. Vila (2023): Genomic model update for Raleigh. 1125 individuals tested from 2017-2022. Presented prediction accuracies for the different traits, with high values for higher heritable traits.

11. Closed the meeting with a thanks to cooperators for their support with GEM. Meeting adjourned at 3:25 PM

GEM Releases

GEMN-0337: GEMN-0287/GEMN-0272-029-01

Exotic Background:

- GEMN-0287 was derived from the single cross GEMN-0108 and GEMN-0178.
- GEMN-0272 was derived from the single cross GEMN-0043 and GEMN-0097.

Hybrid Performance:

EXP 24NCG03	Yield (bu/ac)	% Check Mean	Moisture (%)	Y/M	Test Weight	Stalk Lodging (%)	Root Lodging (%)	Erect Plants (%)	Plant Height (cm)	Ear Height (cm)
GEMN-0337/MBS3640GT	195	96	18.5	10.7	53.7	0.0	0.5	99	275	134
GEMN-0272/MBS3640GT	179	88	16.9	10.5	54.4	0.0	0.6	99	277	135
GEMN-0287/MBS3640GT	175	86	18.5	9.5	55.4	0.0	0.0	100	273	130
Experiment Mean	181		18.2	10.1	56.2	0.1	0.8	99	269	131
Check Mean*	200		18.6	11.1	57.9	0.1	0.2	100	259	126
LSD (0.05)	14.4		0.8	0.9	1.0	0.4	2.5	2.6	8.1	6.5
C.V. (%)	11.1		6.0	12.8	2.4	363.9	431.6	3.6	4.2	6.9

*Checks include Dekalb 67-44, DeKalb 68-95, Pioneer 1464VYHR, Pioneer 1622VYHR, and Pioneer 1847VYHR. Yield, Moisture, Y/M and Test Weight calculated from 13 environments, Root and Stalk Lodging and Erect Plants from 4 environments, and Plant Height from 12 environments and Ear Height from 7 environments.

EXP 24NCG04	Yield (bu/ac)	% Check Mean	Moisture (%)	Y/M	Test Weight	Stalk Lodging (%)	Root Lodging (%)	Erect Plants (%)	Plant Height (cm)	Ear Height (cm)
GEMN-0337/MBS3640GT	190	94	22.0	8.7	53.7	0.5	2.5	97	279	139
GEMN-0272/MBS3640GT	181	89	21.7	8.1	54.6	0.0	4.5	96	270	136
GEMN-0287/MBS3640GT	182	90	21.8	8.4	55.4	0.0	4.1	96	274	138
Experiment Mean	182		20.7	9.0	56.1	0.3	2.3	97	268	132
Check Mean*	197		18.9	10.7	57.5	0.0	0.2	100	262	123
LSD (0.05)	13.6		1.1	0.8	1.0	0.9	3.5	3.5	8.8	7.7
C.V. (%)	10.4		7.2	12.9	2.4	434	206	5.0	4.6	8.1

*Checks include Dekalb 67-44, Pioneer 1464VYHR, Pioneer 1622VYHR, and Pioneer 1847VYHR. Yield, Moisture, Y/M and Test Weight calculated from 14 environments, Root and Stalk Lodging and Erect Plants from 5 environments, and Plant Height from 13 environments and Ear Height from 6 environments.



GEMS-0338: GEMS-0293/GEMS-0281-034-03

Exotic Background:

- GEMS-0293 was derived from the single cross CML341 (Tuxpeño) and a stiff stalk inbred from company 42.
- GEMS-0281 was derived by crossing BR52051 (Dente Amarelo) with inbreds from companies 17, 26, and 41.

Hybrid Performance:

EXP 24NCG05	Yield (bu/ac)	% Check Mean	Moisture (%)	Y/M	Test Weight	Stalk Lodging (%)	Root Lodging (%)	Erect Plants (%)	Plant Height (cm)	Ear Height (cm)
GEMS-0338/MBS6717	206	92	16.8	12.4	55.6	0.0	4.7	95	257	132
GEMS-0281/MBS6717	182	81	17.1	11.0	57.5	0.0	0.0	100	241	120
GEMS-0293/MBS6717	195	87	18.9	10.6	55.5	0.0	0.0	100	246	125
Experiment Mean	199		18.1	11.2	56.3	0.1	0.7	99	251	121
Check Mean*	222		18.6	12.2	57.7	0.1	0.2	100	255	119
LSD (0.05)	12.6		0.9	0.9	1.4	0.5	2.1	2.3	6.6	6.2
C.V. (%)	8.8		6.9	6.9	3.5	879	440	3.2	3.7	7.0

*Checks include DeKalb 63-57, DeKalb 66-18, DeKalb 67-44, Pioneer 1289YHR, Pioneer 1464VYHR, and Pioneer 1622VYHR. Yield, Moisture, Y/M and Test Weight calculated from 12 environments, Root and Stalk Lodging and Erect Plants from 4 environments, and Plant Height from 10 environments and Ear Height from 4 environments.

EXP 24NCG06	Yield (bu/ac)	% Check Mean	Moisture (%)	Y/M	Test Weight	Stalk Lodging (%)	Root Lodging (%)	Erect Plants (%)	Plant Height (cm)	Ear Height (cm)
GEMS-0338/MBS8731	194	92	18.7	10.4	54.5	0.0	0.0	100	276	133
GEMS-0281/MBS8731	193	92	17.7	10.9	55.6	0.0	0.0	100	264	129
GEMS-0293/MBS8731	191	91	20.5	9.6	53.4	0.0	0.7	99	265	134
Experiment Mean	196		18.8	10.6	55.4	0.1	0.3	100	267	132
Check Mean*	212		18.7	11.6	58.1	0.0	0.0	100	255	119
LSD (0.05)	12.5		0.8	0.8	0.7	0.5	1.6	1.7	7.8	7
C.V. (%)	8.9		10.4	10.4	1.9	600	639	2.3	4.1	7.0

*Checks include DeKalb 65-20, DeKalb 66-18, DeKalb 67-44, Pioneer 1464VYHR, Pioneer 1622VYHR, and Pioneer 1847VYHR. Yield, Moisture, Y/M and Test Weight calculated from 12 environments, Root and Stalk Lodging and Erect Plants from 4 environments, and Plant Height from 10 environments and Ear Height from 4 environments.



Table 1. 2024 Line Observations conducted in Clayton, NC.

Entry	Pedigree	Anthesis (GDU)	Silking (GDU)	Ear Height (in)	Plant Height (in)
1	GEMN-0272	1461	1461	90	205
2	GEMN-0287	1496	1513	110	225
3	GEMN-0331	1513	1610	90	190
4	GEMN-0337	1461	1461	105	225
5	GEMS-0293	1813	1746	75	185
6	GEMS-0311	1513	1541	115	235
7	GEMS-0320	1715	1715	105	195
8	GEMS-0321	1575	1610	105	230
9	GEMS-0330	1575	1575	85	210
10	GEMS-0332	1575	1575	55	175
11	GEMS-0333	1646	1646	90	195
12	GEMS-0338	1541	1541	90	215
13	MBS3640GT		1610	40	140
14	MBS3919	1679	1646	90	195
15	MBS6717	1461	1486	50	155
16	MBS8731	1461	1486	60	165
17	MBS8814	1513	1486	70	175
18	PC2754	1407	1513	70	185
19	01INL1	1407	1407	45	155
20	F351	1461	1513	95	195
21	LH235	1715	1646	80	175
22	LH244	1379	1434	80	165
23	LH283	1407	1461	45	140
24	LH287	1610	1575	40	160
25	LH311	1778	1778	65	170
26	NP2031	1379	1379	100	230
27	PH20A	1461	1541	105	225
28	PHMK0	1461	1610	80	185

GEMS-0339: HC33/Ki30//PH42B-012-001-001-B

Exotic Background:

- Ki30 (Caripeno DMR(S)C1-S8-114-1-1) was derived from the cross between CIMMYT's synthesized Caribbean and Tuxpeño composites. Ki30 was identified as having greater resistance against Fusarium ear rot in Thailand (Prathuangwong, et al, 2018) and exhibiting greater resistance against drought in India (Chandel, 2011).

Line Performance:

- Plant height – 220 cm
- Ear height – 80 cm

Hybrid Performance:

EXP 2464205	Yield (bu/ac)	% Check Mean	Moisture (%)	Y/M	Test Weight	RM	Plant Height (cm)	Ear Height (cm)
GEMS-0339/MBS8488	240	92	15.8	15.2	59.6	108	299	108
Experiment Mean	246		16.7	14.7	58.6	108	300	109
Check Mean*	261		16.3	16.0	57.8	109	286	107
H ²	0.91		0.94		0.97		0.93	0.82

*Checks include Wyffels W4240, W5510, W6820, and W7870; Pioneer P0589 and P1185; MBS3919/MBS5507; MBS3628/MBS9530; MBS3520/MBS8814. Replications were grown in 13 environments across IA, IL, IN, MO, NE, and TX.

EXP 2464206	Yield (bu/ac)	% Check Mean	Moisture (%)	Y/M	Test Weight	RM	Plant Height (cm)	Ear Height (cm)
GEMS-0339/PC6567	257	96	18.3	14.0	57.5	112	312	133
Experiment Mean	260		18.8	13.9	57.5	113	315	131
Check Mean*	268		16.8	16.0	57.7	109	297	118
H ²	0.90		0.97		0.95		0.93	0.91

*Checks include Wyffels W4240, W5510, W6820, and W7870; Pioneer P0589 and P1185; MBS3919/MBS5507; MBS3628/MBS9530; MBS3520/MBS8814. Replications were grown in 14 environments across IA, IL, IN, MO, NE, and TX.



GEMS-0340: PHHB9/Ki59//LH244-021-001-001-B

Exotic Background:

- Ki59 ((Agron35/Ki45)-S8-6-1-2-1-3) was derived by crossing Agron35, a commercial tropical hybrid and Ki45.

Line Performance:

- Plant height – 243 cm
- Ear height – 95 cm
- Head smut – 91.5% of plants disease free when inoculated
- Fusarium ear rot – 4.5 (1-9; 9 is the best)

Hybrid Performance:

EXP 2464205	Yield (bu/ac)	% Check Mean	Moisture (%)	Y/M	Test Weight	RM	Plant Height (cm)	Ear Height (cm)
GEMS-0340/MBS8488	248	95	16.6	15.0	58.9	109	303	110
Experiment Mean	246		16.7	14.7	58.6	108	300	109
Check Mean*	261		16.3	16.0	57.8	109	286	107
H ²	0.90		0.94		0.97		0.93	0.82

*Checks include Wyffels W4240, W5510, W6820, and W7870; Pioneer P0589 and P1185; MBS3919/MBS5507; MBS3628/MBS9530; MBS3520/MBS8814. Replications were grown in 13 environments across IA, IL, IN, MO, NE, and TX.

EXP 2464206	Yield (bu/ac)	% Check Mean	Moisture (%)	Y/M	Test Weight	RM	Plant Height (cm)	Ear Height (cm)
GEMS-0340/PC6567	269	100	19.0	14.2	56.8	112	322	136
Experiment Mean	260		18.8	13.9	57.5	113	315	131
Check Mean*	268		16.8	16.0	57.7	109	297	118
H ²	0.90		0.97		0.95		0.93	0.91

*Checks include Wyffels W4240, W5510, W6820, and W7870; Pioneer P0589 and P1185; MBS3919/MBS5507; MBS3628/MBS9530; MBS3520/MBS8814. Replications were grown in 14 environments across IA, IL, IN, MO, NE, and TX.



GEMS-0341: PHK29/55T3//PHTP9-083-001-001-B

Exotic Background:

- 55T3 is a central Brazilian tropical yellow inbred donated by company 55. It was developed for mid to low elevation regions.

Line Performance:

- Plant height – 205 cm
- Ear height – 85 cm
- Head smut – 93% of plants disease free when inoculated
- Fusarium ear rot – 5 (1-9; 9 is the best)

Hybrid Performance:

EXP 2464203	Yield (bu/ac)	% Check Mean	Moisture (%)	Y/M	Test Weight	RM	Plant Height (cm)	Ear Height (cm)
GEMS-0341/MBS8488	223	92	14.4	15.5	59.0	108	285	110
Experiment Mean	217		16.3	13.3	58.3	108	306	118
Check Mean*	242		16.0	15.2	57.8	109	298	120
H ²	0.97		0.95		0.96		0.93	0.90

*Checks include Wyffels W4240, W5510, W6820, and W7870; Pioneer P0589 and P1185; MBS3919/MBS5507; MBS3628/MBS9530; MBS3520/MBS8814. Replications were grown in 15 environments across IA, IL, IN, MO, NE, and TX.

EXP 2464204	Yield (bu/ac)	% Check Mean	Moisture (%)	Y/M	Test Weight	RM	Plant Height (cm)	Ear Height (cm)
GEMS-0341/PC6567	277	108	18.2	15.2	57.2	109	308	123
Experiment Mean	244		16.8	14.5	57.6	108	312	132
Check Mean*	257		16.3	15.8	57.9	109	304	139
H ²	0.95		0.95		0.95		0.85	0.87

*Checks include Wyffels W4240, W5510, W6820, and W7870; Pioneer P0589 and P1185; MBS3919/MBS5507; MBS3628/MBS9530; MBS3520/MBS8814. Replications were grown in 15 environments across IA, IL, IN, MO, NE, and TX.



GEMN-0342: HBA1/CML323//GEMN-0097-029-001-001-B

Exotic Background:

- CML323 is an inbred line developed by CIMMYT from Population 33 (Amarillo Subtropical). Population 33 was developed from the 8th cycle of selection from subtropical intermediate yellow flint Pool 33. Contains predominantly Argentinian (Cateto) flints (Beck, et al, 1991).

Line Performance:

- Plant height – 235 cm
- Ear height – 100 cm
- Head smut – 100% of plants disease free when inoculated
- Fusarium ear rot – 4 (1-9; 9 is the best)

Hybrid Performance:

EXP 2464201	Yield (bu/ac)	% Check Mean	Moisture (%)	Y/M	Test Weight	RM	Plant Height (cm)	Ear Height (cm)
GEMN-0342/MBS3640GT	243	94	21.6	11.2	58.9	111	295	113
Experiment Mean	234		21.6	10.8	59.4	111	293	107
Check Mean*	258		20.5	12.6	60.0	109	291	105
H ²	0.94		0.94		0.95		0.86	0.87

*Checks include Wyffels W4240, W5510, W6820, and W7870; Pioneer P0589 and P1185; MBS3919/MBS5507; MBS3628/MBS9530; MBS3520/MBS8814. Replications were grown in 15 environments across IA, IL, IN, MO, NE, and TX.

EXP 2464202	Yield (bu/ac)	% Check Mean	Moisture (%)	Y/M	Test Weight	RM	Plant Height (cm)	Ear Height (cm)
GEMN-0342/PC3565	220	94	15.9	13.8	58.3	109	306	123
Experiment Mean	211		16.0	13.2	58.3	110	305	117
Check Mean*	234		15.7	14.9	58.0	109	301	116
H ²	0.94		0.94		0.95		0.80	0.80

*Checks include Wyffels W4240, W5510, W6820, and W7870; Pioneer P0589 and P1185; MBS3919/MBS5507; MBS3628/MBS9530; MBS3520/MBS8814. Replications were grown in 14 environments across IA, IL, IN, MO, NE, and TX.



Table 2. Racial Background of GEM Releases

Race	Ames Releases	Raleigh Releases	Other Releases	Total Releases
Alazan	1	0	0	1
Argentino	6	0	0	6
Argentino/Tropical Inbred	5	0	0	5
Argentino/Tuxpeño	1	0	0	1
Camelia	7	0	1	8
Cateto	0	12	0	11
Cateto Sulino	4	0	0	4
Cateto/Mixed Tropical	0	1	0	1
Corn Belt Dent	1	0	0	1
Creole	17	1	1	19
Creole/Tropical Inbred	3	0	0	2
Criollo	1	1	0	2
Criollo/Argentino	0	0	1	1
Criollo/Tusón	1	0	0	1
Cristalino Colorado	16	0	2	18
Cuban Yellow	6	3	0	9
Dentado Blanco	5	0	0	5
Dentado Blanco Rugoso	3	0	3	6
Dente Amarelo	10	3	1	14
Dente Amarelo/Mixed Tropical	2	0	0	2
Dente Branco	5	0	0	5
Early Caribbean	1	0	0	1
Mixed Tropical	13	2	4	19
Mixed Tropical//Dente Amarelo/Tropical Hybrid	1	1	0	1
Multiple Borer Composite	1	0	0	1
Semidentado Riograndense	2	0	0	2
St. Croix	1	1	1	3
Suwan	14	4	0	20
Suwan/Cristalino Colorado	2	0	0	2
Suwan/Tusón	1	0	0	1
Tropical Hybrid	25	77	4	106
Tropical Hybrid/Mixed Tropical	1	2	0	3
Tropical Hybrid/Multiple Borer Composite	1	0	0	1
Tropical Hybrid/Tuxpeño	0	1	0	1
Tropical Inbred	26	10	0	32
Tropical Inbred/Mixed Tropical	1	0	0	1
Tropical Inbred/Tropical Hybrid	1	0	0	1
Tropical Inbred/Tusón	2	0	0	2
Tusón	10	3	1	14
Tuxpeño	4	8	0	12
Tuxpeño/Olotillo	3	0	0	3
Tuxpeño/Olotillo/Tropical Inbred	1	0	0	0
Unclassified Tropical	1	0	0	1
Totals	203	126	19	355

Table 3. GEM Germplasm Releases

Entry	Pedigree	Code	Race	Country	Site	Year
1	Piura 144/B94//B94)	GEMS-0001	Alazan	Peru	Ames	2001
2	FS8A(S):S09-043-002	GEMS-0002	Mixed Tropical	Mixed	Ohio St.	2003
3	BR52051(SE32):S17-B-023-001-B-B	GEMS-0003	Dente Amarelo	Brazil	Raleigh	2003
4	DK212T:S11-B-013-002-B-B	GEMS-0004	Tropical Hybrid	Thailand	Raleigh	2003
5	DK212T:S11-B-015-001-B-B	GEMS-0005	Tropical Hybrid	Thailand	Raleigh	2003
6	DK212T:S11-B-017-001-B-B	GEMS-0006	Tropical Hybrid	Thailand	Raleigh	2003
7	DK212T:S11-B-018-001-B-B	GEMS-0007	Tropical Hybrid	Thailand	Raleigh	2003
8	DK212T:S11-B-038-001-B-B	GEMS-0008	Tropical Hybrid	Thailand	Raleigh	2003
9	DK212T:S11-B-040-001-B-B	GEMS-0009	Tropical Hybrid	Thailand	Raleigh	2003
10	DK212T:S11-B-041-002-B-B	GEMS-0010	Tropical Hybrid	Thailand	Raleigh	2003
11	DK212T:S11-B-045-002-B-B	GEMS-0011	Tropical Hybrid	Thailand	Raleigh	2003
12	DK888:S11-B-003-001-B-B	GEMS-0012	Tropical Hybrid	Thailand	Raleigh	2003
13	DK888:S11-B-004-004-B-B	GEMS-0013	Tropical Hybrid	Thailand	Raleigh	2003
14	DK888:S11-B-010-001-B-B	GEMS-0014	Tropical Hybrid	Thailand	Raleigh	2003
15	DK888:S11-B-014-001-B-B	GEMS-0015	Tropical Hybrid	Thailand	Raleigh	2003
16	DK888:S11-B-015-003-B-B	GEMS-0016	Tropical Hybrid	Thailand	Raleigh	2003
17	DK888:S11-B-025-001-B-B	GEMS-0017	Tropical Hybrid	Thailand	Raleigh	2003
18	DK888:S11-B-026-002-B-B	GEMS-0018	Tropical Hybrid	Thailand	Raleigh	2003
19	DK888:S11-B-029-001-B-B	GEMS-0019	Tropical Hybrid	Thailand	Raleigh	2003
20	DK888:S11-B-033-001-B-B	GEMS-0020	Tropical Hybrid	Thailand	Raleigh	2003
21	DK888:S11-B-035-002-B-B	GEMS-0021	Tropical Hybrid	Thailand	Raleigh	2003
22	DK888:S11-B-035-003-B-B	GEMS-0022	Tropical Hybrid	Thailand	Raleigh	2003
23	DK888:S11-B-039-002-B-B	GEMS-0023	Tropical Hybrid	Thailand	Raleigh	2003
24	DKB830:S11-B-045-001-B-B	GEMS-0024	Tropical Hybrid	Mexico	Raleigh	2003
25	DKXL370:S11-B-001-002-B-B	GEMS-0025	Tropical Hybrid	Brazil	Raleigh	2003
26	DKXL370:S11-B-025-001-B-B	GEMS-0027	Tropical Hybrid	Brazil	Raleigh	2003
27	DKXL370:S11-B-025-002-B-B	GEMS-0028	Tropical Hybrid	Brazil	Raleigh	2003
28	DKXL370:S11-B-028-001-B-B	GEMS-0029	Tropical Hybrid	Brazil	Raleigh	2003
29	DKXL380:S11-B-004-003-B-B	GEMS-0030	Tropical Hybrid	Brazil	Raleigh	2003
30	DKXL380:S11-B-028-001-B-B	GEMS-0031	Tropical Hybrid	Brazil	Raleigh	2003
31	DKXL380:S11-B-029-001-B-B	GEMS-0032	Tropical Hybrid	Brazil	Raleigh	2003
32	BR51403(PE001):N16-B-044-B	GEMN-0033	Cateto	Brazil	Raleigh	2003
33	BR51403(PE001):N16-B-172-B	GEMN-0035	Cateto	Brazil	Raleigh	2003
34	BR51403(PE001):N16-B-176-B	GEMN-0036	Cateto	Brazil	Raleigh	2003
35	BR51403(PE001):N16-B-181-B	GEMN-0037	Cateto	Brazil	Raleigh	2003
36	BR51403(PE001):N16-B-239-B	GEMN-0039	Cateto	Brazil	Raleigh	2003
37	BR51403(PE001):N16-B-431-B	GEMN-0040	Cateto	Brazil	Raleigh	2003
38	BR51403(PE001):N16-B-521-B	GEMN-0041	Cateto	Brazil	Raleigh	2003
39	BR51403(PE001):N16-B-705-B	GEMN-0042	Cateto	Brazil	Raleigh	2003
40	BR51403(PE001):N16-B-857-B	GEMN-0043	Cateto	Brazil	Raleigh	2003
41	CH05015:N12-20-1-B-B	GEMN-0044	Camelia	Chile	Ames	2003
42	CH05015:N12-140-1-B-B	GEMN-0045	Camelia	Chile	Ames	2003
43	CH05015:N15-8-1-B-B	GEMN-0046	Camelia	Chile	Ames	2003
44	UR13085:N0215-014-001	GEMN-0047	Cateto Sulino	Uruguay	Ames	2003
45	DKXL370:N11a20-31-1-B-B	GEMN-0048	Tropical Hybrid	Brazil	Ames	2003

Table 3. GEM Germplasm Releases

Entry	Pedigree	Code	Race	Country	Site	Year
46	DKB844:S1601-512-1-B	GEMS-0049	Tropical Hybrid	Mexico	Ames	2003
47	DKB844:S1601-517-1-B	GEMS-0050	Tropical Hybrid	Mexico	Ames	2003
48	CUBA164:S2008a-83-1-B	GEMS-0051	Creole	Cuba	Ames	2003
49	CUBA164:S2008a-326-1-B	GEMS-0052	Creole	Cuba	Ames	2003
50	CUBA164:S15-192-2-B	GEMS-0053	Creole	Cuba	Ames	2003
51	AR16035:S02-450-1-B	GEMS-0054	Cristalino Colorado	Argentina	Ames	2003
52	AR16035:S02-443-1-B-B	GEMS-0055	Cristalino Colorado	Argentina	Ames	2003
53	FS8B(T):N1809-946-1-B	GEMN-0056	Mixed Tropical	Mixed	Ames	2003
54	AR01150:N04-545-1-B	GEMN-0057	Dentado Blanco Rugoso	Argentina	Ames	2003
55	AR01150:N04-696-1-B	GEMN-0058	Dentado Blanco Rugoso	Argentina	Ames	2003
56	SCRO1:N1310-398-1-B	GEMN-0059	St. Croix	St. Croix	Ames	2003
57	CHIS775:N1912-519-1-B-B	GEMN-0060	Tuxpeño	Mexico	Ames	2003
58	AR16026:S17-10-1-B-B	GEMS-0061	Cristalino Colorado	Argentina	Ames	2003
59	AR16026:S17-16-1-B-B	GEMS-0062	Cristalino Colorado	Argentina	Ames	2003
60	CUBA164:S1511b-325-001	GEMS-0063	Creole	Cuba	Ames	2003
61	CUBA164:S1511b-249-1-B-B	GEMS-0064	Creole	Cuba	Ames	2003
62	CUBA117:S1520-41-1-B-B	GEMS-0065	Argentino	Cuba	Ames	2003
63	CUBA117:S1520-52-1-B-B	GEMS-0066	Argentino	Cuba	Ames	2003
64	GUAT209:S13/(H99ae/OH43ae)-4-4-2-1	GEMS-0067	Tusón	Guatemala	Truman St	2007
65	AR16026:S1704-153-001	GEMS-0068	Cristalino Colorado	Argentina	Ames	2003
66	AR16035:S19-161-001	GEMS-0069	Cristalino Colorado	Argentina	Ames	2003
67	CH05015:N12-183-001	GEMN-0070	Camelia	Chile	Ames	2003
68	CH05015:N15-003-001	GEMN-0071	Camelia	Chile	Ames	2003
69	CHIS775:S1911b-439-001	GEMS-0072	Tuxpeño	Mexico	Ames	2003
70	CUBA117:S15-372-001	GEMS-0073	Argentino	Cuba	Ames	2003
71	CUBA164:S1517-163-001	GEMS-0074	Creole	Cuba	Ames	2003
72	CUBA164:S1517-241-002	GEMS-0075	Creole	Cuba	Ames	2003
73	DKB844:N11b-118-001	GEMN-0076	Tropical Hybrid	Mexico	Ames	2003
74	DKXL370:N11a20-604-001	GEMN-0077	Tropical Hybrid	Brazil	Ames	2003
75	FS8A(S):S09-362-001	GEMS-0078	Mixed Tropical	Mixed	Ames	2003
76	FS8B(S):S0316-802-001	GEMS-0079	Mixed Tropical	Mixed	Ames	2003
77	FS8B(S):S0316-814-001	GEMS-0080	Mixed Tropical	Mixed	Ames	2003
78	FS8B(T):N1802-382-001	GEMN-0081	Mixed Tropical	Mixed	Ames	2003
79	FS8B(T):N1802-525-001	GEMN-0082	Mixed Tropical	Mixed	Ames	2003
80	GUAT209:N1925-081-001	GEMN-0083	Tusón	Guatemala	Ames	2003
81	PASCO14:S0105-198-001	GEMS-0084	Cuban Yellow	Peru	Ames	2003
82	UR01089:S0525-519-001	GEMS-0085	Cateto Sulino	Uruguay	Ames	2003
83	UR10001:S1813-257-001	GEMS-0086	Dente Branco	Uruguay	Ames	2003
84	AR03056:N09-024-001	GEMN-0087	Dentado Blanco	Argentina	Ames	2004
85	AR03056:N09-182-001	GEMN-0088	Dentado Blanco	Argentina	Ames	2004
86	AR03056:N09-191-001	GEMN-0089	Dentado Blanco	Argentina	Ames	2004
87	AR03056:N09-250-001	GEMN-0090	Dentado Blanco	Argentina	Ames	2004
88	CHIS740:S1411a-783-002	GEMS-0091	Tuxpeño/Olotillo	Mexico	Ames	2004
89	CUBA164:S2012-444-001	GEMS-0092	Creole	Cuba	Ames	2004
90	CUBA164:S2012-966-001	GEMS-0093	Creole	Cuba	Ames	2004

Table 3. GEM Germplasm Releases

Entry	Pedigree	Code	Race	Country	Site	Year
91	DKXL370:N11a20-199-002	GEMN-0094	Tropical Hybrid	Brazil	Ames	2004
92	DKXL370:N11a20-234-002	GEMN-0095	Tropical Hybrid	Brazil	Ames	2004
93	DKXL370:N11a20-322-001	GEMN-0096	Tropical Hybrid	Brazil	Ames	2004
94	FS8B(T):N11a-087-001	GEMN-0097	Mixed Tropical	Mixed	Ames	2004
95	FS8B(T):N11a-110-001	GEMN-0098	Mixed Tropical	Mixed	Ames	2004
96	FS8B(T):N11a-322-001	GEMN-0099	Mixed Tropical	Mixed	Ames	2004
97	UR11003:S0302-937-001	GEMS-0100	Dente Branco	Uruguay	Ames	2004
98	DK212T:S11b-007-B-B	GEMS-0101	Tropical Hybrid	Thailand	Raleigh	2004
99	DK888:S11b-001-B	GEMS-0102	Tropical Hybrid	Thailand	Raleigh	2004
100	DK888:N11(95)-B-027-010-B-B	GEMN-0103	Tropical Hybrid	Thailand	Raleigh	2004
101	DK888:N11(95)-B-027-012-B-B	GEMN-0104	Tropical Hybrid	Thailand	Raleigh	2004
102	DK888:N11(95)-B-027-015-B-B	GEMN-0105	Tropical Hybrid	Thailand	Raleigh	2004
103	DK888:N11(95)-B-022-007-B-B	GEMN-0106	Tropical Hybrid	Thailand	Raleigh	2004
104	DK888:N11(95)-B-022-012-B-B	GEMN-0107	Tropical Hybrid	Thailand	Raleigh	2004
105	DK888:N11(95)-B-027-001-B-B	GEMN-0108	Tropical Hybrid	Thailand	Raleigh	2004
106	DKXL380:N11-B-015-003-B-B	GEMN-0109	Tropical Hybrid	Brazil	Raleigh	2004
107	BARBGP2:N08a18-332-001	GEMN-0110	Tusón	Barbados	Ames	2005
108	CH05015:N1204-057-001	GEMN-0111	Camelia	Chile	Ames	2005
109	CH05015:N1502-086-001	GEMN-0112	Camelia	Chile	Ames	2005
110	CHIS775:S1911b-120-001	GEMS-0113	Tuxpeño	Mexico	Ames	2005
111	DK212T:N11a12-191-001	GEMN-0114	Tropical Hybrid	Thailand	Ames	2005
112	DKB844:S1601-073-001	GEMS-0115	Tropical Hybrid	Mexico	Ames	2005
113	DKB844:S1601-003-002	GEMS-0116	Tropical Hybrid	Mexico	Ames	2005
114	DREP150:N2011d-624-001	GEMN-0117	Mixed Tropical	Dominican Republic	Ames	2005
115	UR11003:S0302-1011-001	GEMS-0118	Dente Branco	Uruguay	Ames	2005
116	CHS775:N19-042-001-B	GEMN-0119	Tuxpeño	Mexico	Raleigh	2005
117	CHS775:N19-042-003-B	GEMN-0120	Tuxpeño	Mexico	Raleigh	2005
118	CHS775:N19-027-010-B	GEMN-0121	Tuxpeño	Mexico	Raleigh	2005
119	CHS775:N19-093-002-B	GEMN-0122	Tuxpeño	Mexico	Raleigh	2005
120	CHS775:N19-030-011-B	GEMN-0123	Tuxpeño	Mexico	Raleigh	2005
121	DK212T:N11-B-003-001-B	GEMN-0124	Tropical Hybrid	Thailand	Raleigh	2005
122	DK888:S11-B-029-001-B	GEMS-0125	Tropical Hybrid	Thailand	Raleigh	2005
123	DK888:S11-B-029-006-B	GEMS-0126	Tropical Hybrid	Thailand	Raleigh	2005
124	DK888:N11(95)-B-017-001-B	GEMN-0127	Tropical Hybrid	Thailand	Raleigh	2005
125	DKXL370:N11-B-005-002-B	GEMN-0128	Tropical Hybrid	Brazil	Raleigh	2005
126	DKXL370:N11-B-005-006-B	GEMN-0129	Tropical Hybrid	Brazil	Raleigh	2005
127	DKXL370:N11-B-005-010-B	GEMN-0130	Tropical Hybrid	Brazil	Raleigh	2005
128	DKXL370:N11-B-005-011-B	GEMN-0131	Tropical Hybrid	Brazil	Raleigh	2005
129	DKXL370:N11-B-005-021-B	GEMN-0132	Tropical Hybrid	Brazil	Raleigh	2005
130	DKXL370:N11-B-029-002-B	GEMN-0133	Tropical Hybrid	Brazil	Raleigh	2005
131	DKXL380:N11-B-010-017-B	GEMN-0134	Tropical Hybrid	Brazil	Raleigh	2005
132	DKXL380:N11-B-007-025-B	GEMN-0135	Tropical Hybrid	Brazil	Raleigh	2005
133	DKXL380:N11-B-007-028-B	GEMN-0136	Tropical Hybrid	Brazil	Raleigh	2005
134	SCR Gp3:N14-028-003-003-B	GEMN-0137	Tusón	St. Croix	Raleigh	2005
135	AR17056:N2035-421-001	GEMN-0138	Cristalino Colorado	Argentina	Ames	2006

Table 3. GEM Germplasm Releases

Entry	Pedigree	Code	Race	Country	Site	Year
136	AR17056:N2035-473-001	GEMN-0139	Cristalino Colorado	Argentina	Ames	2006
137	BR51675:N0620-033-001	GEMN-0140	Dente Amarelo	Brazil	Ames	2006
138	BR51675:N0620-053-001	GEMN-0141	Dente Amarelo	Brazil	Ames	2006
139	BR52060:S0210-143-001	GEMS-0142	Dente Amarelo	Brazil	Ames	2006
140	BR52060:S0210-147-001	GEMS-0143	Dente Amarelo	Brazil	Ames	2006
141	MDI022:N2120-284-001	GEMN-0144	Cuban Yellow	Peru	Ames	2006
142	MDI022:N2120-333-001	GEMN-0145	Cuban Yellow	Peru	Ames	2006
143	NEI9004:S2818-003-001	GEMS-0146	Tropical Inbred	Thailand	Ames	2006
144	NEI9004:S2818-025-001	GEMS-0147	Tropical Inbred	Thailand	Ames	2006
145	NEI9004:S2818-376-001	GEMS-0148	Tropical Inbred	Thailand	Ames	2006
146	UR05017:S0415-180-002	GEMS-0149	Semidentado Riograndense	Uruguay	Ames	2006
147	UR05017:S0415-187-001	GEMS-0150	Semidentado Riograndense	Uruguay	Ames	2006
148	CHIS775:N19-042-001-003-B-B-B-B	GEMN-0151	Tuxpeño	Mexico	Raleigh	2006
149	DK212T:N11-B-016-005-B-B-B	GEMN-0152	Tropical Hybrid	Thailand	Raleigh	2006
150	DKXL380:N11-B-007-027-B-B-B-B	GEMN-0153	Tropical Hybrid	Brazil	Raleigh	2006
151	AR13026:N08b15-016	GEMN-0154	Cristalino Colorado	Argentina	Ames	2007
152	AR13026:N08b15-086	GEMN-0155	Cristalino Colorado	Argentina	Ames	2007
153	BR51721:N2012-098-002	GEMN-0156	Dente Amarelo	Brazil	Ames	2007
154	BR51721:N2012-164-002	GEMN-0157	Dente Amarelo	Brazil	Ames	2007
155	BR51721:N2012-397-001	GEMN-0158	Dente Amarelo	Brazil	Ames	2007
156	CASH:N1410-018-001	GEMN-0159	Corn Belt Dent	USA	Ames	2007
157	CUBA117:S1542-037-002	GEMS-0160	Argentino	Cuba	Ames	2007
158	CUBA117:S1542-057-001	GEMS-0161	Argentino	Cuba	Ames	2007
159	CUBA117:S1542-057-002	GEMS-0162	Argentino	Cuba	Ames	2007
160	CUBA164:S2012-456-001	GEMS-0163	Creole	Cuba	Ames	2007
161	DK212T:N11-B-003-022-B-B-B	GEMN-0164	Tropical Hybrid	Thailand	Raleigh	2007
162	DK888:N11(95)-B-022-012-026-B-B	GEMN-0165	Tropical Hybrid	Thailand	Raleigh	2007
163	DK888:N11(95)-B-027-001-008-B-B	GEMN-0166	Tropical Hybrid	Thailand	Raleigh	2007
164	DK888:N11(95)-B-027-001-018-B-B	GEMN-0167	Tropical Hybrid	Thailand	Raleigh	2007
165	DK888:N11(95)-B-027-001-019-B	GEMN-0168	Tropical Hybrid	Thailand	Raleigh	2007
166	DK888:N11(95)-B-027-001-027-B	GEMN-0169	Tropical Hybrid	Thailand	Raleigh	2007
167	DK888:N11(95)-B-027-001-030-B	GEMN-0170	Tropical Hybrid	Thailand	Raleigh	2007
168	DK888:N11(95)-B-027-001-037-B	GEMN-0171	Tropical Hybrid	Thailand	Raleigh	2007
169	DK888:N11(95)-B-027-001-040-B	GEMN-0172	Tropical Hybrid	Thailand	Raleigh	2007
170	DK888:N11(95)-B-027-012-009-B	GEMN-0173	Tropical Hybrid	Thailand	Raleigh	2007
171	AR17056:N2025-574-001	GEMN-0174	Cristalino Colorado	Argentina	Ames	2008
172	BVIR155:S2012-029-001	GEMS-0175	Tusón	British Virgin Islands	Ames	2008
173	CUBA164:S2008c-289-001	GEMS-0176	Creole	Cuba	Ames	2008
174	DK888:N11a08a-395-001	GEMN-0177	Tropical Hybrid	Thailand	Ames	2008
175	DK888:N11a08a-440-001	GEMN-0178	Tropical Hybrid	Thailand	Ames	2008
176	FS8B(T):N11a08c-030-002	GEMN-0179	Mixed Tropical	Mixed	Ames	2008
177	GUAT209:S1308a-047-001	GEMS-0180	Tusón	Guatemala	Ames	2008
178	GUAT209:S1308a-068-001	GEMS-0181	Tusón	Guatemala	Ames	2008
179	GUAT209:S1308a-084-001	GEMS-0182	Tusón	Guatemala	Ames	2008
180	GUAT209:S1308a-104-001	GEMS-0183	Tusón	Guatemala	Ames	2008

Table 3. GEM Germplasm Releases

Entry	Pedigree	Code	Race	Country	Site	Year
181	GUAT209:S1308a-120-001	GEMS-0184	Tusón	Guatemala	Ames	2008
182	CUBA164:S2012-966-001-B wx	GEMS-0185	Creole	Cuba	Ames	2008
183	DKXL370:N11a20-036-002-B wx	GEMN-0186	Tropical Hybrid	Brazil	Ames	2008
184	ANTIG03:N1218-056-001	GEMN-0187	Criollo	Antigua	Ames	2009
185	DKXL212:S0912-012-001	GEMS-0188	Tropical Hybrid	Brazil	Ames	2009
186	DKXL212:S0912-117-001	GEMS-0189	Tropical Hybrid	Brazil	Ames	2009
187	PASCO14:N0424-078-001	GEMN-0190	Cuban Yellow	Peru	Ames	2009
188	SCROGP3:N2017-003-001	GEMN-0191	Tusón	St. Croix	Ames	2009
189	SCROGP3:N2017-172-001	GEMN-0192	Tusón	St. Croix	Ames	2009
190	UR11002:N0308b-086-001	GEMN-0193	Dente Branco	Uruguay	Ames	2009
191	DK888:N11(95)-B-027-001-011-B	GEMN-0194	Tropical Hybrid	Thailand	Raleigh	2009
192	DK888:N11(95)-B-027-001-015-B	GEMN-0195	Tropical Hybrid	Thailand	Raleigh	2009
193	DK888:N11(95)-B-003-001-001-B	GEMN-0196	Tropical Hybrid	Thailand	Raleigh	2009
194	DK888:N11(95)-002-021-008-B-B	GEMN-0197	Tropical Hybrid	Thailand	Raleigh	2009
195	DK212T:N11-040-001-007	GEMN-0198	Tropical Hybrid	Thailand	Raleigh	2009
196	AR16021:S0908a-039-001	GEMS-0199	Cristalino Colorado	Argentina	Ames	2010
197	BR105:S1612-008-001	GEMS-0200	Suwan	Brazil	Ames	2010
198	BR105:S1612-057-001	GEMS-0201	Suwan	Brazil	Ames	2010
199	BR105:S1640-128-001	GEMS-0202	Suwan	Brazil	Ames	2010
200	CUBA164:S2008dF44-012-001	GEMS-0203	Creole	Cuba	Ames	2010
201	FS8A(T):N1804-006-001	GEMN-0204	Mixed Tropical	Mixed	Ames	2010
202	GUAD05:N3215-197-001	GEMN-0205	Early Caribbean	Guadalupe	Ames	2010
203	AR16035:S02-615-001-B wx	GEMS-0206	Cristalino Colorado	Argentina	Ames	2010
204	BR51403(PE001):N16-B-044-004-001-001C-001	GEMN-0207	Cateto	Brazil	Raleigh	2010
205	BR51403(PE001):N16-B-044-004-001-002G-003	GEMN-0208	Cateto	Brazil	Raleigh	2010
206	BR51721(RN07):N20-B-017-002	GEMN-0209	Dente Amarelo	Brazil	Raleigh	2010
207	CL-G1607(CML420):N11-008-001-007	GEMN-0210	Tropical Inbred	Mexico	Raleigh	2010
208	DK888:N11-B-027-012-B-007	GEMN-0212	Tropical Hybrid	Thailand	Raleigh	2010
209	DKXL380:N11-B-007-010-B-002	GEMN-0213	Tropical Hybrid	Brazil	Raleigh	2010
210	MDI022:N21-B-002-003	GEMN-0214	Cuban yellow	Peru	Raleigh	2010
211	NS1:S08-006-001-002	GEMS-0215	Tropical Inbred	Thailand	Raleigh	2010
212	PASCO14:N11b-B-001-002	GEMN-0216	Cuban Yellow	Peru	Raleigh	2010
213	DK888:N11-B-027-001-B-001	GEMN-0217	Tropical Hybrid	Thailand	Raleigh	2010
214	(CUBA164:S2012-459-001-B/GEMS-0002)-B-B-011	GEMS-0218	Creole	Cuba	Ames	2011
215	(CUBA164:S2012-459-001-B/GEMS-0002)-B-B-031	GEMS-0219	Creole	Cuba	Ames	2011
216	(GEMS-0113/GEMS-0091)-B-058-001	GEMS-0220	Tuxpeño/Olotillo	Mexico	Ames	2011
217	BR105:N1641-159-001	GEMN-0221	Suwan	Brazil	Ames	2011
218	MBRC10:S1741-B-057	GEMS-0222	Multiple Borer Composite	Mexico	Ames	2011
219	CUBA164:S2012-444-001-B wx	GEMS-0223	Creole	Cuba	Ames	2011
220	BG070404:D27S42-B-014	GEMS-0224	Unclassified Tropical	Venezuela	Ames	2012
221	BR105:N16a16b-B-074	GEMN-0225	Suwan	Brazil	Ames	2012
222	BR106:S(LH132)(PHG39)-B-053	GEMS-0226	Tuxpeño	Brazil	Ames	2012
223	NEI9004:S2809-B-022	GEMS-0227	Tropical Inbred	Thailand	Ames	2012
224	NEI9004:S2809-B-025	GEMS-0228	Tropical Inbred	Thailand	Ames	2012
225	SANM126:N12(LH123)-B-033	GEMN-0229	Cuban Yellow	Peru	Ames	2012

Table 3. GEM Germplasm Releases

Entry	Pedigree	Code	Race	Country	Site	Year
226	CML413:N18-001-036-002	GEMN-0230	Tropical Inbred	Mexico	Raleigh	2012
227	CUBA164:D27-B-017-001	GEMN-0231	Creole	Cuba	Raleigh	2012
228	SCR_Gp3:N14-028-003-B-002	GEMN-0232	Tusón	St. Croix	Raleigh	2012
229	CML329:N18-001-020-001	GEMN-0233	Tropical Inbred	Mexico	Raleigh	2012
230	AR17026:S1648-B-030	GEMS-0234	Cristalino Colorado	Argentina	Ames	2013
231	CUBA173:S0446-B-030	GEMS-0235	Criollo/Tusón	Cuba	Ames	2013
232	DK212T:N11a10-B-110	GEMN-0236	Tropical Hybrid	Thailand	Ames	2013
233	DKXL370:S08c17c-B-008	GEMS-0237	Tropical Hybrid	Brazil	Ames	2013
234	NEI9004:N0803-B-027	GEMN-0238	Tropical Inbred	Thailand	Ames	2013
235	NEI9004:N0803-B-053	GEMN-0239	Tropical Inbred	Thailand	Ames	2013
236	UR13085:S(N28)(CUBA117:S1520-156-1-B-B)-B-023	GEMS-0240	Cateto Sulino	Uruguay	Ames	2013
237	UR13085:S(N28)(CUBA117:S1520-156-1-B-B)-B-058	GEMS-0241	Cateto Sulino	Uruguay	Ames	2013
238	SE32(BR52051):N11c-015-004-B	GEMN-0242	Dente Amarelo	Brazil	Raleigh	2013
239	CML287:S15-024-003-B	GEMS-0243	Tropical Inbred	Mexico	Raleigh	2013
240	CML287:S15-027-001-B	GEMS-0244	Tropical Inbred	Mexico	Raleigh	2013
241	DK888:S11b-037-018-008-B	GEMS-0245	Tropical Hybrid	Thailand	Raleigh	2013
242	AR01150:N0402-B-026	GEMN-0246	Dentado Blanco Rugoso	Argentina	Ames	2014
243	AR03056:N0902-064-001-B-B	GEMN-0247	Dentado Blanco	Argentina	Ames	2014
244	AR16042:S0208-B-012-B-B	GEMS-0248	Cristalino Colorado	Argentina	Ames	2014
245	BR105:N1643-B-020-B-B	GEMN-0249	Suwan	Brazil	Ames	2014
246	CL-G1703:S17c43-B-023-B-B	GEMS-0250	Tropical Inbred	Mexico	Ames	2014
247	CL-G1703:S17c43-B-026-B-B	GEMS-0251	Tropical Inbred	Mexico	Ames	2014
248	DKB844:N11b18-241-001-B-B	GEMN-0252	Tropical Hybrid	Mexico	Ames	2014
249	DK212T:S0640-034-002	GEMS-0253	Tropical Hybrid	Thailand	NC	2015
250	FS8B(T):N11a-225-002	GEMN-0254	Mixed Tropical	Mixed	NC	2015
251	FS8B(S):S03-133-002	GEMS-0255	Mixed Tropical	Mixed	Raleigh	2015
252	NS1:S0834-006-002	GEMS-0256	Suwan	Thailand	Raleigh	2015
253	CHIS462:N08d-013-001	GEMN-0257	Tuxpeño	Mexico	Raleigh	2015
254	DKB830:S19-009-004	GEMS-0258	Tropical Hybrid	Mexico	Raleigh	2015
255	SCR01:N11c-015-002	GEMN-0259	St. Croix	St. Croix	Raleigh	2015
256	(GEMN-0140/GEMN-0097)-B-B-026-B-B	GEMN-0260	Dente Amarelo/Mixed Tropical	Brazil/Mixed	Ames	2015
257	(GEMN-0140/GEMN-0097)-B-B-027-B-B	GEMN-0261	Dente Amarelo/Mixed Tropical	Brazil/Mixed	Ames	2015
258	(GEMS-0147/GEMS-0180)-B-104-001-B-B	GEMS-0262	Tropical Inbred/Tusón	Thailand/Guatemala	Ames	2015
259	BR105:S1626(GEMS-0175)-B-049-B-B	GEMS-0263	Suwan/Tusón	Brazil/Virgin Islands	Ames	2015
260	BR105:S1643-078-001-B-B	GEMS-0264	Suwan	Brazil	Ames	2015
261	DKXL212:S0950-B-083-B-B	GEMS-0265	Tropical Hybrid	Brazil	Ames	2015
262	NEI9008:N0826(GEMN-0155)-B-074-B-B	GEMN-0266	Suwan/Cristalino Colorado	Thailand/Argentina	Ames	2015
263	NEI9008:N0826(GEMN-0155)-B-095-B-B	GEMN-0267	Suwan/Cristalino Colorado	Thailand/Argentina	Ames	2015
264	NS1:S0852-B-021-B-B	GEMS-0268	Suwan	Thailand	Ames	2015
265	NS1:S0852-B-054-B-B	GEMS-0269	Suwan	Thailand	Ames	2015
266	ANTIG01:N16-050-002	GEMN-0270	Criollo	Antigua	Raleigh	2016
267	BR105:N16-043-001	GEMN-0271	Suwan	Brazil	Raleigh	2016
268	(GEMN-0043/GEMN-0097)-B-001	GEMN-0272	Cateto/Mixed Tropical	Brazil/Mixed	Raleigh	2016
269	(GEMS-0032/GEMS-0050)-B-007	GEMS-0273	Tropical Hybrid/Tropical Hybrid	Brazil/Mexico	Raleigh	2016
270	(GEMS-0032/GEMS-0113)-B-004	GEMS-0274	Tropical Hybrid/Tuxpeño	Brazil/Mexico	Raleigh	2016

Table 3. GEM Germplasm Releases

Entry	Pedigree	Code	Race	Country	Site	Year
271	((KO679Y/GEMS-0115)/GEMS-0162)-008-001	GEMS-0275	Tropical Inbred	South Africa	Ames	2016
272	(53SS4/GEMS-0026)-SIB-B-003	GEMS-0276	Tropical Hybrid	Brazil	Ames	2016
273	(53SS4/GEMS-0031)-SIB-B-039	GEMS-0277	Tropical Hybrid	Brazil	Ames	2016
274	(GEMS-0115/S49w)-B-B-036	GEMS-0278	Tropical Hybrid	Mexico	Ames	2016
275	(GEMS-0176/S49w)-B-B-028	GEMS-0279	Creole	Cuba	Ames	2016
276	BR52051:S172641-B-018	GEMS-0280	Dente Amarelo	Brazil	Ames	2016
277	BR52051:S172641-B-054	GEMS-0281	Dente Amarelo	Brazil	Ames	2016
278	CHIS740:S(PHW17)(87916W)-126-001	GEMS-0282	Tuxpeño/Olotillo	Mexico	Ames	2016
279	UR11002:S1409-068-001	GEMS-0283	Dente Branco	Uruguay	Ames	2016
280	AR17056:S1217-B-025	GEMS-0284	Cristalino Colorado	Argentina	Ames	2016
281	(GEMN-0117/DKXL212:N11a-139-001-001-B-B-B-B-B)-B-B-019	GEMN-0285	Tropical Hybrid	Thailand	Ames	2016
282	MDI022:N(PHG35)(GEMN-0097)-072-001	GEMN-0286	Cuban yellow	Peru	Ames	2016
283	(GEMN-0108/GEMN-0178)-B-004	GEMN-0287	Tropical Hybrid	Thailand	Raleigh	2016
284	(GEMS-0147/GEMS-0115)-B-002-001-001-B	GEMS-0288	Tropical Inbred/Tropical Hybrid	Thailand/Mexico	Ames	2017
285	(GEMS-0147/GEMS-0180)-B-033-001-001-B	GEMS-0289	Tropical Inbred/Tusón	Thailand/Guatemala	Ames	2017
286	BR52051:S172641-B-050-001-B	GEMS-0290	Dente Amarelo	Brazil	Ames	2017
287	KI21:S(DJ7)(GEMS-0115)-B-051-002-B	GEMS-0291	Tropical Inbred	Thailand	Ames	2017
288	(GEMN-0097/GEMN-0136)-B-008	GEMN-0292	Mixed Tropical/Tropical Hybrid	Mixed/Brazil	Raleigh	2017
289	CML341:S42-B-124	GEMS-0293	Tropical Inbred (Tuxpeño)	Mexico	Raleigh	2017
290	DKB844:S16-005-022-012	GEMS-0294	Tropical Hybrid	Mexico	Raleigh	2017
291	DKB830:S51-031-003	GEMS-0295	Tropical Hybrid	Mexico	Raleigh	2017
292	(GEMS-0113/GEMS-0162)-B-B-054-001	GEMS-0296	Tuxpeño/Argentino	Mexico/Cuba	Ames	2018
293	(GEMS-0115/GEMS-0222)-B-B-033-001	GEMS-0297	Tropical Hybrid/Multiple Borer Composite	Mexico	Ames	2018
294	(GEMS-0219/GEMS-0227)-B-015-001	GEMS-0298	Creole/Tropical Inbred	Cuba/Thailand	Ames	2018
295	(H8431/((GEMS-0115/Mp717)/TZAR101))-SIB-B-005-001	GEMS-0299	Tropical Inbred	Nigeria	Ames	2018
296	NS1:S(GEMS-0149)41-051-001-001	GEMS-0300	Suwan	Thailand	Ames	2018
297	NS1:S(GEMS-0149)41-066-001-001	GEMS-0301	Suwan	Thailand	Ames	2018
298	ATL100:N(LH82)(GEMN-0097)-041-001	GEMN-0302	Tropical Hybrid/Mixed Tropical	Brazil/Mixed	Ames	2018
299	(GEMS-0162/GEMS-0227)-040-002-001	GEMS-0303	Argentino/Tropical Inbred	Cuba/Thailand	Ames	2019
300	(GEMS-0162/GEMS-0227)-046-001-001	GEMS-0304	Argentino/Tropical Inbred	Cuba/Thailand	Ames	2019
301	(GEMS-0227/PHP38)-018-001-001	GEMS-0305	Tropical Inbred	Thailand	Ames	2019
302	((LH195/KO679Y)/GEMS-0227)-010-001-002	GEMS-0306	Tropical Inbred/Tropical Inbred	South Africa/Thailand	Ames	2019
303	((PHB47/CML373)/GEMS-0162)-SIB-053-002	GEMS-0307	Tropical Inbred/Argentino	Mexico/Cuba	Ames	2019
304	((PHB47/CML373)/GEMS-0162)-SIB-086-001	GEMS-0308	Tropical Inbred/Argentino	Mexico/Cuba	Ames	2019
305	ATL100:N(LH82)(GEMN-0097)-090-001	GEMN-0309	Tropical Hybrid	Brazil	Ames	2019
306	(GEMN-0104/GEMN-0097)-070-003	GEMN-0310	Tropical Hybrid/Mixed Tropical	Thailand/Mixed	Raleigh	2019
307	BR106:S42-063-002	GEMS-0311	Tuxpeño	Brazil	Raleigh	2019
308	PASCO14:S11a-128-003	GEMS-0312	Cuban Yellow	Peru	Raleigh	2019
309	((GEMS-0162/PHP38)/GEMS-0227)-206-001-001	GEMS-0313	Argentino/Tropical Inbred	Cuba/Thailand	Ames	2020
310	((GEMS-0227/KI14)/12)-080-001-002	GEMS-0314	Tropical Inbred	Thailand	Ames	2020
311	(GEMS-0227/(Mp494/GEMS-0002)-001-002-001-001)-SIB-138-001-002	GEMS-0315	Tropical Inbred/Mixed Tropical	Thailand/Mixed	Ames	2020
312	((KO679Y/GEMS-0030)/12)-090-001-001	GEMS-0316	Tropical Inbred	South Africa	Ames	2020
313	(GEMN-0097/(GEMN-0140/GEMN-0130))-002-001-002	GEMN-0317	Mixed Tropical//Dente Amerelo/Tropical Hybrid	Mixed/Brazil	Ames	2020
314	(GEMN-0097/TF-2-0-T3-P74-G121)-147-001-002	GEMN-0318	Mixed Tropical	Mixed	Ames	2020
315	KI14:N4212-185-001-002	GEMN-0319	Tropical Inbred	Thailand	Ames	2020

Table 3. GEM Germplasm Releases

Entry	Pedigree	Code	Race	Country	Site	Year
316	La Posta Sequia C7 F71-1-1-1-2-B*4:S40b-B-031	GEMS-0320	Tropical Inbred	Mexico	Raleigh	2021
317	La Posta Sequia C7 F71-1-1-1-2-B*4:S40b-B-018	GEMS-0321	Tropical Inbred	Mexico	Raleigh	2021
318	KO679Y/GEMS-0030//794-015-001-001-B	GEMS-0322	Tropical Inbred	South Africa	Ames	2022
319	GEMS-0219//GEMS-0147/GEMS-0227-SIB-B-122-001-B	GEMS-0323	Creole/Tropical Inbred	Cuba/Thailand	Ames	2022
320	GEMS-0227/Ki14//41-002-001-001-B	GEMS-0324	Tropical Inbred	Thailand	Ames	2022
321	PHN46//GEMN-0130/Mp494///41-002-001-001-B	GEMN-0325	Tropical Inbred/Tropical Inbred	Brazil/Mixed	Ames	2022
322	GEMS-0220/CML373//R3212Z-069-002-001-B	GEMS-0326	Tuxpeño/Olotillo/Tropical Inbred	Mexico	Ames	2023
323	GEMS-0227/CML373//R3212Z-087-002-001-B	GEMS-0327	Tropical Inbred	Thailand/Mexico	Ames	2023
324	GEMS-0227/Ki14//GEMS-0218-040-001-001-B	GEMS-0328	Creole/Tropical Inbred	Thailand/Cuba	Ames	2023
325	GEMS-0227/Ki14//PHW51-005-001-001-B	GEMS-0329	Tropical Inbred	Thailand	Ames	2023
326	(GEMS-0050/CL-G1501:S17b-B-020)-003-01-B	GEMS-0330	Tropical Hybrid/Tropical Inbred	Mexico	Raleigh	2024
327	GEMN-0135/GEMN-0137-002-02	GEMN-0331	Tropical Hybrid/Tusón	Brazil/St. Croix	Raleigh	2024
328	GEMS-0227/42T1-B05-02	GEMS-0332	Tropical Inbred	Thailand	Raleigh	2024
329	GEMS-0227/42T2-B44-01	GEMS-0333	Tropical Inbred	Thailand	Raleigh	2024
330	La Posta Seq C7 F71-1-1-1-2:S40a/R3212Z-060-001-001-B	GEMS-0334	Tropical Inbred	Mexico	Ames	2024
331	PHHB4/KS23-6//2FACC-139-001-001-B	GEMS-0335	Tropical Inbred	Thailand	Ames	2024
332	PHHB9//KS23-6/PHW52-139-001-001-B	GEMS-0336	Tropical Inbred	Thailand	Ames	2024
333	GEMN-0287/GEMN-0272-029-01	GEMN-0337	Tropical Hybrid/Cateto/Mixed	Thailand/Brazil	Raleigh	2025
334	GEMS-0293/GEMS-0281-034-03	GEMS-0338	Tropical Inbred/Dente Amarelo	Mexico/Brazil	Raleigh	2025
335	HC33/Ki30//PH42B-012-001-001-B	GEMS-0339	Tropical Inbred	Thailand	Ames	2025
336	PHHB9/Ki59//LH244-021-001-001-B	GEMS-0340	Tropical Inbred	Thailand	Ames	2025
337	PHK29/55T3//PHTP9-083-001-001-B	GEMS-0341	Tropical Inbred	Brazil	Ames	2025
338	HBA1/CML323//GEMN-0097-029-001-001-B	GEMN-0342	Tropical Inbred	Mexico	Ames	2025
1	DKXL212:N11a-139-001-001	DE EXP	Tropical Hybrid	Brazil	Deleware	2003
2	DE3 (DKXL212:N11a-191)	DE3	Tropical Hybrid	Brazil	Deleware	2002
3	DE4 (DKXL212:N11a-365)	DE4	Tropical Hybrid	Brazil	Deleware	2002
4	DE6 (DKXL212:N11a-234)	DE6	Tropical Hybrid	Brazil	Deleware	2005
5	NY212 (FS8B(T):N1802-212)	NY212	Mixed Tropical	Mixed	Cornell	2009
6	NY215 (FS8B(T):N1802-215)	NY215	Mixed Tropical	Mixed	Cornell	2009
7	NY266 (AR01150:N0406-266)	NY266	Dentado Blanco Rugoso	Argentina	Cornell	2009
8	Tx204 (AR01150:N0406)	Tx204	Dentado Blanco Rugoso	Argentina	Texas A&M	2004
9	Tx205 (AR01150:N0406)	Tx205	Dentado Blanco Rugoso	Argentina	Texas A&M	2004
10	W605S (AR17026:N1019)	W605S	Cristalino Colorado	Argentina	Wisconsin	2004
11	W606S (SCRO1:N1310)	W606S	St. Croix	St. Croix	Wisconsin	2009
12	W607S (BR52051:N04)	W607S	Dente Amarelo	Brazil	Wisconsin	2009
13	W608S (CH05015:N15)	W608S	Camelia	Chile	Wisconsin	2009
14	W609S (FS8B(T):N11a)	W609S	Mixed Tropical	Mixed	Wisconsin	2009
15	W610S (CUBA164:S2012)	W610S	Creole	Cuba	Wisconsin	2009
16	W615S (GEM Quality Syn. GQS C0)	W615S	Criollo/Argentino	Cuba	Wisconsin	2013
17	W616S (AR16026:S1719)	W616S	Cristalino Colorado	Argentina	Wisconsin	2013

Bolded codes are Crop Science Registered

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GEM – Raleigh Project

Germplasm Releases:

- There will be two new releases from the Raleigh project for 2025, please see the “GEM Releases” section of this book for more information on the performance of these lines in hybrid combinations.

Table 4. 2025 GEM-Raleigh Germplasm Releases

Line	Pedigree	% Exotic
GEMN-0337	GEMN-0287/GEMN-0272-029-01	43.75
GEMS-0338	GEMS-0293/GEMS-0281-034-03	31.25

Germplasm Development:

- Approximately 2,200 GEM nursery plots were grown in Clayton, NC (10% increase from 2023), and 200 additional nursery rows were contracted with Gro Alliance in Mt Pulaski, IL. Almost 2900 isolation plots across four different Peterson Corn Genetics testers (MBS3640GT, PC2754, MBS6717 and MBS8731) were planted under contract with Gro Alliance, a 30% decrease from 2023.
- A small number of breeding crosses were produced in the summer nursery this year (mostly new GEM releases x previous releases), and these will be evaluated and selfed in the 2025 summer nursery. Several combinations of exotic x temperate crosses are planned for winter nursery in Puerto Vallarta.
- Weather conditions were again less than favorable for the nursery but better than in 2023. We had higher than usual temperatures and dry conditions from planting to flowering before the rains finally arrived. Nursery pollinations started in early June, about a week earlier than normal, and unlike last year we had a clean break between the first and second nurseries.
- We sent 630 plots to winter nursery with Semillas Moreno-Retis near Puerto Vallarta, Mexico. Most of the germplasm sent to Mexico was for breeding cross development or for making testcrosses for yield trials. We are looking into other possibilities for winter nursery as well, but the timing of our growing season in North Carolina and the maturities of the germplasm we are working with restricts our options.

Germplasm Evaluations:

- Overall, about 14,000 yield plots were coordinated from Raleigh, with almost 10,500 planted in North Carolina and the rest planted by six cooperators (Corteva, University of Tennessee, AgReliant, USDA-Starkville and GEM-Ames) at locations throughout the Southeast and Midwest. This is the third year we had trials planted in NC under contract with the NC Official Variety Testing group. They planted close to

500 plots at each of four different locations, two in the eastern part of NC, one in the coastal plain and one in the Piedmont.

- We had difficulties with several of the yield trial locations in NC; only one location planted by the NC OVT group produced decent data, with two others affected by the dry conditions and a last suffering from Billbug damage early in the season. All of the NC OVT locations are on-farm and none are irrigated. We also had germination issues at our location in Salisbury, NC which led to unusable data for some experiments, and planter issues at our Clayton location forced us to abandon the trials we planted there.
- Bayer planted approximately 1150 plots of testcrosses from two different breeding crosses and will be sending us the data to make selections.

Personnel:

- Dr. David Marshall, Research Leader for the Plant Science Research Unit for about 20 years, retired in January of 2022, and we are still working on finding his replacement (Round 4 of interviews starts soon, we hope....)

Host Plant Resistance:

- GEM releases were evaluated for mycotoxin accumulation by USDA-ARS researchers at Starkville, MS, and 2023 data is presented in the “**Host Plant Resistance**” section of this book. We hope to have the 2024 data available to post on the website in the near future.
- GEM releases were evaluated for Fall Armyworm leaf feeding by USDA-ARS researchers at Starkville, MS, and 2024 data is presented in the “**Host Plant Resistance**” section of this book.
- Northern Leaf Blight (Laurel Springs, NC) and Southern Leaf Blight (Clayton, NC) evaluations were conducted for GEM lines in 2024, see the “**Host Plant Resistance**” section of this book. We are hoping to add Gray Leaf Spot evaluations in 2025, depending on the availability of locations in the western part of NC.

Breeding Cross and Other Observations:

- Breeding crosses were planted in two different blocks at Clayton, NC during 2024, and one of the blocks was inoculated with Southern Leaf Blight. Notes on the entries are presented in the “**Breeding Cross Observations**” section of this book.
- There are several breeding crosses that appear promising, and decisions will be made as to which crosses best represent both the exotic sources and the temperate parents. We will be looking to initiate inbreeding and selection in 12-15 new breeding crosses in the 2025 nursery.
- A subset of about 140 entries of the germplasm recently donated by Bayer was planted in the field in 2023, and selections made for lines to evaluate further. We based the initial subset on the exotic parentage of the lines, choosing races of maize that are underrepresented in our breeding efforts and/or more equatorial and lowland in origin (landraces from Argentina and Chile or from high altitudes tend to perform poorly in North Carolina). The selections were crossed to appropriate testers in 2024 and will hopefully be evaluated in 2025.

Thanks again to our yield trial Cooperators, Corteva, Bayer, AgReliant, the University of Tennessee (Dennis West) USDA-Starkville and GEM Ames, and a big thanks to Bayer for nursery and genomic prediction support as well. Also, USDA-ARS Raleigh, Starkville and Tifton have provided us with valuable host plant resistance data for several years.

Table 5. 2024 GEM-Raleigh Cooperator In-Kind Support

Cooperator	In-kind support
Corteva	Yield Trials (7 locations, 2500 plots overall)
Bayer	Yield Trials (2 locations, 1150 plots overall) and Nursery (Advance two populations from S0) Genotyping and genomic prediction
AgReliant	Yield Trials (1 location, 224 plots)
University of Tennessee-Knoxville	Yield Trials (1 location, 272 plots)
GEM-Ames	Yield Trials (2 locations, 320 plots)
USDA-ARS Starkville	Aflatoxin and Fumonison evaluations (20 entries), FAW Evaluations (12 entries), Yield Trials (240 plots)
USDA-ARS Tifton	FAW and CEW evaluations (30 entries)

GEM – Ames Project

Germplasm Releases and Development:

- Three hundred and thirty-eight (338) GEM line releases, from the Raleigh and Ames Projects, are now available to GEM Cooperators. A total of 349 lines have been released, including 19 from our university collaborators.
- The Ames program will be releasing four new GEM lines for the 2025 planting season. Summary data for the 2025 releases can be found in the “**GEM Releases**” section of this handout.

Table 6. 2025 GEM-Ames Germplasm Releases

Line	Pedigree	% Exotic
GEMS-0339	HC33/Ki30//PH42B-012-001-001-B	25
GEMS-0340	PHHB9/Ki59//LH244-021-001-001-B	25
GEMS-0341	PHK29/55T3//PHTP9-083-001-001-B	25
GEMN-0342	HBA1/CML323//GEMN-0097-029-001-001-B	50

Breeding Nursery:

- Eleven S_1 populations were sent to four Cooperators for in-kind support. Populations were advanced to the S_2 generation.
- An additional 80 S_1 populations were advanced to the S_2 generation by Force Genetics, GEM-Ames, and Gro Alliance.
- Thirty S_2 populations were advanced to the S_3 generation by Gro Alliance. S_3 progeny will be topcrossed in 2025 for 2026 grain yield testing.
- DH lines were increased from the populations:
 1. GEMN-0144/GEMN-0249//GEMN-0187/GEMN-0261///GEMN-0192/GEMN-0309//GEMN-0246/GEMN-0267
 2. GEMS-0226/GEMS-0264//GEMS-0297/GEMS-0308///GEMS-0066/GEMS-0268//GEMS-0072/GEMS-0251
- Final counts of DH lines were 1,264 and 1,100 for the GEMS and GEMN populations, respectively.
- Hand pollinations were made in 1,548 nursery rows.
 1. An additional 1,304 rows were sent to Gro Alliance for hand pollinations.
- Observation rows total 4,082.
 1. Breeding material observation rows totaled 1,668.
 2. 2,414 observations rows were grown for Cooperator's.

Isolated Crossing Summary:

- A total of 5,816 isolated crossing rows were planted.
 1. 3,440 rows were managed by GEM-Ames.
 2. 2,376 rows were sent to Gro Alliance.

Genomic Prediction Project:

- A collaborative project with Bayer Crop Science was initiated to explore use of genomic prediction in GEM breeding program. Bayer has committed to run 100 high-density parental samples and 2,500 low-density genotyping samples, annually.
- GEM-Ames sent 22 new parental lines and 2,256 segregating lines.
- Genomic estimated breeding values generated by this project were used by GEM-Ames for selecting lines to include within 1st year yield trials.

Breeding Cross Observations:

- Three hundred and thirty-five populations were observed and evaluated in Ames, IA. From these populations, 50 were selected and sent to winter nursery to be advanced to the S₁ generation.

Host Plant Resistance:

- Pathology and entomology research collaborators from the U.S. private and public sectors screened GEM releases for Southern Leaf Blight, Goss's Bacterial Wilt, Head Smut, Fusarium Ear Rot, Aspergillus, and Tar Spot. Disease evaluation trials are summarized in Table 7.

Table 7. 2024 Host Plant Resistance Experiment Summary

Cooperator	Location	Disease	Plots
Bayer	Nebraska	Goss's Bacterial Wilt	500
	Illinois	Tar Spot	500
Corteva	California	Fusarium Ear Rot	500
	California	Head Smut	500
Michigan St.	Michigan	Tar Spot	700
USDA-ARS	Georgia	Aflatoxin/Fall Army Worm	16
	North Carolina	Northern Leaf Blight/Southern Leaf Blight	50
	Mississippi	Aflatoxin/Fumonisin/Fall Army Worm	30
Wyffels	Illinois	Goss's Bacterial Wilt	150

Yield Trials:

- Approximately 15,002 plots (2,210 entries) were managed or coordinated through Ames in 2024 (Table 8; See the “Yield Trials” section of this book for trial summaries).
- Of the core development program, 4,060 plots were devoted to 2nd year trials and 9,978 plots for 1st year trials.
- Planting dates ranged from 25 April to 17 May. Excessive rainfall in early May delayed planting by many weeks.
- Flooding caused significant damage in Crawfordsville and the site was discarded. Herbicide damage in Keystone resulted in a loss of several experiments.

- Stand count data was collected in collaboration with Iowa Crop Improvement Association using their drone data collection system.

Table 8. Ames and Cooperator Yield Trial Resource Summary

Trial Type	# Entries	# Plots Ames	# Plots Coops	Total Plots
1st Year Trials	1,616	8,402	1,576	9,978
2nd Year Trials	276	1,043	3,017	4,060
Released Line Trials	46	230	414	644
Collaborator Trials	272	320	0	320
Totals	2,210	9,995	5,010	15,002

GEM Cooperators in 2024:

- Maize Research Institute, Ministry of Agriculture and Forestry of the Republic of Turkey, has submitted application documents and has been approved for a trial period.
- West Africa Centre for Crop Improvement, University of Ghana, has requested application documents. We are currently waiting for the completed application.
- Turkish Genetics has requested application documents. We are currently waiting for the completed application.

Germplasm Donation:

- Bayer Crop Science initiated a germplasm project in 2016 to adapt several land races to the central Corn-Belt. Representative accessions (1 to 5 per land race) were selected and crossed to a current elite 105-day SS and 105-day NSS inbred line. Crosses were made within each land race and lines selected for flowering in central Iowa. Lines were recombined and selected through the 2019 growing season for adaptation to central Iowa.
- Table 9 lists the landraces and percentages of the tropical donor for the lines increased in winter 2024/2025.

Table 9. Germplasm Donation Increase Summary

Race	% Tropical	Group	Country
Morocho	50, 62.5, 75	NSS	Peru
Puya	50	NSS	Columbia
Tepecintle	50, 62.5, 75	NSS	Guatemala
Costeno	50	SS	Columbia
Sabanero	50, 62.5	SS	Columbia

GEM Top Lines Project:

- The third round of the GEM Top Line trial started in 2023 with Cooperators topcrossing selected GEM lines.
- GEMN-0178 and GEMS-0298 will carry over from round 2 to round 3 for Ames, and GEMN-0287 and GEMS-0293 will carry over for the Raleigh Program. Round 3 will also include 5 GEMN lines from Ames and 2 from Raleigh. Ames has submitted 22 GEMS lines and Raleigh has submitted 8 lines.
- The topcrossed seed from the 30 lines described above were planted in 2024 for grain yield testing.

Thank you to AgReliant, Bayer, Becks, Corteva, DKD Genetics, Force Genetics, GEM-Raleigh, KMR, Maximum Production Genetics, Michigan State, Wyffels, and the numerous USDA groups. Your continued support is irreplaceable.

Table 10. 2024 GEM-Ames Cooperator In-Kind Support

Cooperator	In-kind support
Ag Reliant	Yield Trials
Bayer	Yield Trials, Nursery work, Genotyping, Disease testing, and Genomic Prediction
Becks	Yield Trials
Corteva	Yield Trials (traditional and drought), Sequencing, DH lines, Disease testing
DKD Genetics	Yield Trials
Force Genetics	Nursery work
GEM-Raleigh	Yield Trials, Disease testing, Germplasm
KMR	Yield Trials
Maximum Production Genetics	Germplasm and Nursery work
Michigan State	Disease testing
USDA	Ga1 screening, Disease testing, Insect feeding
Wyffels	Yield Trials, Disease testing, Germplasm

Breeding Cross Observation

Table 11. 2024 Breeding Cross Observations – GEM Raleigh

Entry	Pedigree	GDU Anthesis	GDU Silking	Plant Height (in)	Ear Height (in)	Exotic parentage background	Notes
1	17DHD16//GEMS-0113/NX20T0030-B	1460	1485	250	113	Novasem donated line; White Tuxpeño	Ear height variable, decent ears but some ear rot, some SLB, potentially plant in 2025
2	17DHD16//GEMS-0311/NX20T0037-B	1460	1478	260	120	Novasem donated line; White Tuxpeño	Ear height a concern, decent ears but some ear rot, little SLB, potentially plant in 2025
3	17QFB1//GEMS-0311/NX20T0037-B	1435	1478	235	113	Novasem donated line; White Tuxpeño	Ear height a concern, decent ears but some ear rot (better than 17DHD16), little SLB, potentially plant in 2025
4	90DJD28//GEMS-0311/NX20T0037-B	1485	1525	225	100	Novasem donated line; White Tuxpeño	Ear height variable, decent ears but some ear rot, little SLB, potentially plant in 2025
5	17DHD16//GEMS-0050/NX20T0060-B	1410	1427	217	98	Novasem donated line; White Tuxpeño	Probably too early, ear height variable, decent ears, some SLB
6	22DHQ3//GEMS-0050/NX20T0060-B	1455	1455	225	113	Novasem donated line; White Tuxpeño	OK ears (narrow), little SLB, maybe plant in 2025
7	4SCQ3//GEMS-0050/NX20T0060-B	1470	1500	220	95	Novasem donated line; White Tuxpeño	Long narrow ears, some SLB, potentially plant in 2025
8	PHAG6//GEMS-0050/NX20T0060-B	1485	1500	210	98	Novasem donated line; White Tuxpeño	OK ears with some ear rot, potentially plant in 2025
9	22DHQ3//GEMS-0115/NX20T0062-B	1465	1465	240	110	Novasem donated line; White Tuxpeño	Ear height variable, fairly decent ears but some ear rot, little SLB, maybe plant in 2025
10	WDHQ11//GEMS-0115/NX20T0062-B	1465	1478	225	95	Novasem donated line; White Tuxpeño	Decent ears, better than WDHQ2 cross, potentially plant in 2025
11	WDHQ2//GEMS-0115/NX20T0062-B	1440	1455	240	108	Novasem donated line; White Tuxpeño	Ear height variable, OK ears with some ear rot, probably skip
12	LH303//GEMS-0258/NX20T0064-B	1500	1510	230	108	Novasem donated line; White Tuxpeño	Decent and clean but slender ears, potentially plant in 2025
13	PH2JR//GEMS-0258/NX20T0064-B	1500	1500	235	105	Novasem donated line; White Tuxpeño	Ear height variable, fairly decent ears but some ear rot (bigger than LH303 ears), little SLB, maybe plant in 2025
14	GTO84/GEMS-0227	1515	1554	290	145	Celaya	High ear height, long shanks, poor husk cover, some ear rot, needs second cross
15	GTO84/LH228//PH79A	1485	1500	247	120	Celaya	Ear height and ear quality are concerns, several plants leaning, probably skip
16	GTO84/LH242//PH79A	1525	1554	230	120	Celaya	Ear height, ear rot and husk cover are concerns, several plants lodged, probably skip
17	GTO84/PH37C//LH242	1485	1515	225	110	Celaya	Ear height variable, decent ears but some ear rot, some SLB, potentially plant in 2025
18	JAL167B/DK_90DJD28//LH242	1478	1535	250	125	Celaya	Ear height variable, OK ears but some ear rot, some SLB, potentially plant in 2025
19	JAL167B/DK_90DJD28//PH79A	1485	1525	220	110	Celaya	Ear quality a concern, several plants leaning, some SLB, probably skip
20	CML343/GEMS-0032//LH242	1500	1540	240	110	CIMMYT (La Posta Sequia)	Ear height variable, decent ears, some SLB, potentially plant in 2025
21	CML343/GEMS-0032//PH79A	1478	1515	240	120	CIMMYT (La Posta Sequia)	Ear height variable, several plants leaning, maybe plant in 2025 to try a PH79A cross
22	DK_FBLL/CML287//DK_90DJD28	1455	1478	245	120	CIMMYT (Population 24)	Ear height and quality are concerns, probably skip
23	DK_FBLL/CML287//PH37C	1478	1500	265	150	CIMMYT (Population 24)	Ear height and quality are concerns, a few contaminants, probably skip
24	LH233/CML287//LH238	1427	1478	245	120	CIMMYT (Population 24)	Decent ears, a few contaminants, potentially plant in 2025
25	BR106/GEMS-0227	1570	1570	285	135	Tuxpeño	High ear height, decent ears, some SLB, needs second cross
26	Chiapas 462/GEMS-0227	1554	1615	280	135	Tuxpeño	High ear height, decent ears but some ear rot, some SLB, needs second cross
27	Pool26GT)%B/GEMS-0227	1525	1554	265	125	CIMMYT (Late Yellow Tropical Dent)	Ear height variable, decent ears, probably needs a second cross but might be worth trying in 2025 nursery

Table 11. 2024 Breeding Cross Observations – GEM Raleigh

Entry	Pedigree	GDU Anthesis	GDU Silking	Plant Height (in)	Ear Height (in)	Exotic parentage background	Notes
28	POPULATION 21 (IST) C2/GEMS-0227	1410	1427	250	115	CIMMYT Popn 21	Ear height variable, decent ears, probably worth trying in 2025 nursery
29	POPULATION 44 (IST) C2/GEMS-0227	1515	1515	270	130	CIMMYT Popn 44	Ear height variable, decent ears, probably needs a second cross
30	POPULATION 44 (IST) C2/LH242	1500	1525	250	115	CIMMYT Popn 44	Ear height variable, decent ears, probably worth trying in 2025 nursery
31	La Posta Sequia C6-001)%B/GEMS-0227	1500	1554	255	115	CIMMYT (La Posta Sequia)	Ear quality a concern, probably skip
32	Vandeno Synthetic/GEMS-0227	1535	1554	250	120	Vandeno	Ear height variable, decent ears, probably needs a second cross but might be worth trying in 2025 nursery
33	CML343/GEMS-0298	1554	1570	245	105	CIMMYT (La Posta Sequia)	Late, nice clean ears, plant in 2025 nursery
34	CML373/GEMS-0298	1500	1515	230	110	CIMMYT (La Posta Sequia)	Decent ears, planted in winter 2024 nursery
35	CML380/GEMS-0298	1525	1540	245	105	CIMMYT Popn 501	Decent ears, planted in winter 2024 nursery
36	GEMS-0293/PH79A	1500	1515	230	105	CIMMYT (La Posta Sequia)	Ear height variable, several leaning, decent ears but probably skip
37	CML373/PH79A	1478	1465	215	120	CIMMYT (La Posta Sequia)	Decent ears but some ear rot, a few contaminants, maybe plant in 2025
38	D940Y/PH79A	1500	1525	240	115	South African inbred	Decent ears, several plants leaning, some SLB, probably skip
39	La Posta Seq C7 F71-001-001-002-B-B-B/LH238	1427	1455	245	105	CIMMYT (La Posta Sequia)	Good clean ears, little SLB
40	La Posta Seq C7 F71-1-1-1-2-B-B-B/DK_90DJD28	1490	1525	230	105	CIMMYT (La Posta Sequia)	Decent ears but ear height a concern
41	La Posta Seq C7 F71-1-1-1-2-B-B-B/PH37C	1500	1540	250	125	CIMMYT (La Posta Sequia)	Decent ears but ear height too high, cross again or skip
42	NEI402020/DK_90DJD28	1490	1525	245	110	Inbred from Nakon Suwan (Thailand)	Decent ears but ear height too high, cross again or skip, performed poorly in nursery
43	NEI402020/LH238	1455	1500	255	105	Inbred from Nakon Suwan (Thailand)	Decent ears, performed well in nursery
44	NEI402020/PH37C	1540	1570	240	125	Inbred from Nakon Suwan (Thailand)	Ear height a concern, some issues with SLB and ear rot
45	DK_8F196/MDS3501)-B	1478	1515	205	85	MPG donated inbred	Ear height variable, decent ears, some ear rot, SLB an issue
46	DK_90DJD28/MDS3501)-B	1455	1468	190	90	MPG donated inbred	Ears a concern, some ear rot, better than DK_8F196 cross
47	PH37C/MDS3501)-B	1427	1515	210	85	MPG donated inbred	Ear height variable, some ear rot
48	GEMS-0115/MDS3501)-B	1525	1540	215	105	MPG donated inbred	Susceptible to SLB, some ear rot, skip
49	GEMS-0147/MDS3501)-B	1515	1540	180	85	MPG donated inbred	Small ears, some ear rot
50	GEMS-0200/MDS3501)-B	1515	1540	190	95	MPG donated inbred	Decent ears, some SLB, some ear rot
51	GEMS-0226/MDS3501)-B	1540	1554	215	110	MPG donated inbred	Ear height variable, some SLB, some small ears, several leaning
52	GEMS-0311/MDS3501)-B	1500	1554	195	90	MPG donated inbred	Plant in 2025 summer nursery
53	GEMS-0321/MDS3501)-B	1570	1587	200	95	MPG donated inbred	Some SLB but plant in 2025 summer nursery
54	01HGI2//GEMN-0238/NX20T0043-B	1455	1465	210	95	Novasem donated line; White ETO	Decent ears, a little SLB, some ear rot, plant in 2025?
55	01INL1//GEMN-0238/NX20T0043-B	1440	1478	210	95	Novasem donated line; White ETO	Ear rot issues, probably skip
56	LH274//GEMN-0238/NX20T0043-B	1440	1454	210	100	Novasem donated line; White ETO	Ear rot issues, some SLB, probably skip
57	17INI20//GEMN-0257/NX20T0047-B	1490	1500	205	95	Novasem donated line; White ETO	Ear rot issues, probably skip
58	01HGI4//GEMN-0104/NX20T0054-B	1427	1440	215	110	Novasem donated line; White ETO	Ear height variable, some ear rot, possibly plant in 2025
59	LH274//GEMN-0097/NX20T0066-B	1338	1397	210	95	Novasem donated line; White ETO	Ear rot and husk cover issues, too early? Probably skip
60	LH293//GEMN-0272/NX20T0075-B	1400	1415	245	115	Novasem donated line; White ETO	Some ear rot and husk cover issues
61	Barbados GP2/LH287	1565	1660	285	135	Coastal Tropical Flint	Needs a second cross, some lodging
62	Ucayali 12/LH287	1600	1600	280	130	Cubano Amarillo Duro	Probably needs a second cross, some lodging
63	POPULATION 32 (IST) C2/LH287	1490	1540	280	130	CIMMYT Popn 32 (ETO)	Probably needs a second cross, some lodging, decent ears
64	Lima 13/LH287	1490	1515	280	130	Perla	Probably needs a second cross, some lodging, decent ears

Table 11. 2024 Breeding Cross Observations – GEM Raleigh

Entry	Pedigree	GDU Anthesis	GDU Silking	Plant Height (in)	Ear Height (in)	Exotic parentage background	Notes
65	PM-801-#/LH287	1525	1525	275	135	Peruvian hybrid, Perla?	Probably needs a second cross, some lodging, decent ears but some ear rot
66	St. Croix Group 3/LH287	1465	1500	250	105	Tusón?	Possibly workable, decent ears
67	TropHyb40/LH287	1515	1525	250	110	Company 40 tropical hybrid	Probably needs a second cross, some ear rot
68	Valle 343/LH287	1500	1500	255	130		Probably needs a second cross, some lodging, decent ears but some ear rot
69	CML375/LH287	1440	1465	210	100	CIMMYT Popn 44	Decent ears but some lodging
70	CML376/LH287	1515	1515	240	100	CIMMYT SLWHG(A)	Ear height a concern, decent ears
71	CML384/LH287	1600	1616	265	125	CIMMYT Popn 502	Ear height a problem, decent ears
72	CML449/01INL1	1440	1465	225	110	CIMMYT Popn 32 (ETO)	Ear height a concern, nice ears
73	CML449/LH287	1380	1440	230	100	CIMMYT Popn 32 (ETO)	Nice ears but lodging is a problem, some ear rot
74	CML449/LH293	1455	1455	255	120	CIMMYT Popn 32 (ETO)	Ear height a problem, decent ears, longer than other crosses with CML449
75	CML449/PH32C	1500	1525	275	125	CIMMYT Popn 32 (ETO)	Ear height a problem, decent ears but cross again or skip
76	CML451/01INL1	1600	1690	235	100	CIMMYT	Probably too late, needs second cross
77	CML451/LH287	1525	1515	250	105	CIMMYT	Decent ears but some lodging
78	CML451/LH293	1616	1690	250	110	CIMMYT	Probably too late, needs second cross
79	CML451/PH32C	1585	1706	250	115	CIMMYT	Needs second cross
80	CML97/LH287	1410	1440	210	90	CIMMYT Popn 42	Ear height a concern, nice ears
81	FL_4BT7/LH287	1427	1410	220	100	Florida Synthetic	Good clean ears, some lodging
82	FL_4BT7/LH293	1465	1455	255	115	Florida Synthetic	Ear height a concern, decent ears but some ear rot
83	FL_4BT7/PH32C	1465	1478	255	115	Florida Synthetic	Ear height a problem, decent ears but some ear rot
84	Ki45/01INL1	1515	1540	215	110	MPG donated inbred	Decent ears, compact, some ear rot
85	Ki45/LH287	1455	1478	210	95	MPG donated inbred	Good ears, compact
86	Ki45/LH293	1500	1554	230	115	MPG donated inbred	Ear height a concern, decent ears
87	Ki45/PH32C	1540	1554	245	120	MPG donated inbred	Probably needs a second cross, good ears
88	Ki59/01INL1	1478	1515	230	110	MPG donated inbred	Ear height a concern, decent ears but some ear rot
89	Ki59/LH287	1455	1478	245	105	MPG donated inbred	Decent ears but some lodging
90	La Posta Seq C7 F64-1-1-1-1-B-B-B/LH287	1427	1440	235	105	CIMMYT (La Posta Sequia)	Ear height a concern, decent ears but some ear rot
91	La Posta Seq C7 F64-1-1-1-2-B-B-B/LH287	1455	1495	235	110	CIMMYT (La Posta Sequia)	Ear height a concern, decent ears but some ear rot
92	La Posta Seq C7 F71-1-1-1-2-B-B-B/LH287	1415	1440	240	120	CIMMYT (La Posta Sequia)	Ear height a problem, decent ears, some lodging
93	LH283/MPG6602)-B	1500	1490	175	80	Inbred from MPG, Oh43 background	Compact, some SLB and ear rot
94	LH287/MPG6602)-B	1490	1490	200	100	Inbred from MPG, Oh43 background	Some SLB and ear rot
95	LH293/MPG6602)-B	1385	1426	200	75	Inbred from MPG, Oh43 background	Husk cover and ear rot problems, probably too early
96	LH303/MPG6602)-B	1415	1478	175	80	Inbred from MPG, Oh43 background	SLB a problem, some ear rot
97	MPG6602/01INL1)-B	1478	1500	175	75	Inbred from MPG, Oh43 background	Ear rot a problem, some SLB
98	MPG6602/GEMN-0272)-B	1478	1478	210	80	Inbred from MPG, Oh43 background	Ear and stalk rots a problem, probably needs cross to a second GEM line

Table 12. 2024 Breeding Cross Observations – GEM Ames

Entry	Pedigree	GDU Anthesis	GDU Silking	Plant Height (cm)	Ear Height (cm)	HG	Exotic parentage background
1	01HGI2//GEMN-0097/42T3	1412	1463	320	123	NSS	Company 42 donated line
2	01INL1//GEMN-0097/42T3	1424	1463	300	113	NSS	Company 42 donated line
3	17INI20//GEMN-0097/42T3	1490	1516	310	125	NSS	Company 42 donated line
4	17INI30//GEMN-0097/42T3	1477	1529	330	143	NSS	Company 42 donated line
5	4IBZ1A//GEMN-0097/42T3	1423	1451	340	135	NSS	Company 42 donated line
6	70LDL5//GEMN-0097/42T3	1437	1477	318	135	NSS	Company 42 donated line
7	83INI14//GEMN-0097/42T3	1553	1581	345	153	NSS	Company 42 donated line
8	83INI8//GEMN-0097/42T3	1477	1490	348	155	NSS	Company 42 donated line
9	90LCL6//GEMN-0097/42T3	1424	1451	348	153	NSS	Company 42 donated line
10	91INH2//GEMN-0097/42T3	1410	1423	345	143	NSS	Company 42 donated line
11	LH277//GEMN-0097/42T3	1410	1423	310	128	NSS	Company 42 donated line
12	LH279//GEMN-0097/42T3	1516	1503	320	135	NSS	Company 42 donated line
13	PH04G//GEMN-0097/42T3	1437	1476	335	128	NSS	Company 42 donated line
14	PH1GD//GEMN-0097/42T3	1362	1412	320	133	NSS	Company 42 donated line
15	PH3HH//GEMN-0097/42T3	1529	1566	323	120	NSS	Company 42 donated line
16	01HGI2//GEMN-0178/42T4	1410	1450	318	123	NSS	Company 42 donated line
17	01INL1//GEMN-0178/42T4	1424	1477	308	130	NSS	Company 42 donated line
18	17INI20//GEMN-0178/42T4	1410	1437	315	130	NSS	Company 42 donated line
19	17INI30//GEMN-0178/42T4	1423	1463	345	143	NSS	Company 42 donated line
20	4IBZ1A//GEMN-0178/42T4	1464	1490	318	130	NSS	Company 42 donated line
21	70LDL5//GEMN-0178/42T4	1423	1490	325	130	NSS	Company 42 donated line
22	83INI14//GEMN-0178/42T4	1437	1464	353	155	NSS	Company 42 donated line
23	83INI8//GEMN-0178/42T4	1412	1463	338	140	NSS	Company 42 donated line
24	90LCL6//GEMN-0178/42T4	1412	1437	335	153	NSS	Company 42 donated line
25	91INH2//GEMN-0178/42T4	1489	1553	338	155	NSS	Company 42 donated line
26	94INK1A//GEMN-0178/42T4	1437	1464	330	135	NSS	Company 42 donated line
27	LH277//GEMN-0178/42T4	1451	1503	298	138	NSS	Company 42 donated line
28	LH279//GEMN-0178/42T4	1451	1464	315	143	NSS	Company 42 donated line
29	PH04G//GEMN-0178/42T4	1464	1526	333	150	NSS	Company 42 donated line
30	PH1GD//GEMN-0178/42T4	1398	1450	318	150	NSS	Company 42 donated line
31	PH3HH//GEMN-0178/42T4	1464	1542	305	130	NSS	Company 42 donated line
32	PH50P//GEMN-0178/42T4	1412	1450	333	140	NSS	Company 42 donated line
33	01DIB2//GEMS-0226/42T1	1437	1450	313	150	SS	Company 42 donated line
34	87DIA4//GEMS-0226/42T1	1424	1423	323	155	SS	Company 42 donated line
35	90DJD28//GEMS-0226/42T1	1490	1542	333	138	SS	Company 42 donated line

Table 12. 2024 Breeding Cross Observations – GEM Ames

Entry	Pedigree	GDU Anthesis	GDU Silking	Plant Height (cm)	Ear Height (cm)	HG	Exotic parentage background
36	LH303//GEMS-0226/42T1	1476	1529	323	135	SS	Company 42 donated line
37	PH2JR//GEMS-0226/42T1	1490	1529	325	140	SS	Company 42 donated line
38	PHJ8R//GEMS-0226/42T1	1542	1592	350	163	SS	Company 42 donated line
39	WDHQ11//GEMS-0226/42T1	1542	1529	338	160	SS	Company 42 donated line
40	WDHQ2//GEMS-0226/42T1	1592	1605	325	150	SS	Company 42 donated line
41	17QFB1//GEMS-0226/42T2	1451	1490	318	123	SS	Company 42 donated line
42	22DHQ3//GEMS-0226/42T2	1423	1451	333	145	SS	Company 42 donated line
43	4SCQ3//GEMS-0226/42T2	1437	1464	310	128	SS	Company 42 donated line
44	79314N1//GEMS-0226/42T2	1464	1477	320	140	SS	Company 42 donated line
45	F351//GEMS-0226/42T2	1477	1503	308	123	SS	Company 42 donated line
46	PH3DT//GEMS-0226/42T2	1451	1503	313	135	SS	Company 42 donated line
47	01DIB2//GEMS-0227/42T1	1423	1423	323	135	SS	Company 42 donated line
48	09DSQ1//GEMS-0227/42T1	1464	1490	323	128	SS	Company 42 donated line
49	17DHD7//GEMS-0227/42T1	1464	1477	313	120	SS	Company 42 donated line
50	90DJD28//GEMS-0227/42T1	1464	1450	340	143	SS	Company 42 donated line
51	LH303//GEMS-0227/42T1	1477	1516	335	145	SS	Company 42 donated line
52	PH2JR//GEMS-0227/42T1	1477	1503	320	125	SS	Company 42 donated line
53	PHJ8R//GEMS-0227/42T1	1451	1464	328	148	SS	Company 42 donated line
54	WDHQ11//GEMS-0227/42T1	1450	1463	328	133	SS	Company 42 donated line
55	17DHD16//GEMS-0227/42T2	1424	1424	308	115	SS	Company 42 donated line
56	17QFB1//GEMS-0227/42T2	1373	1375	303	113	SS	Company 42 donated line
57	22DHQ3//GEMS-0227/42T2	1385	1423	328	138	SS	Company 42 donated line
58	4SCQ3//GEMS-0227/42T2	1362	1412	305	110	SS	Company 42 donated line
59	79314N1//GEMS-0227/42T2	1424	1437	293	120	SS	Company 42 donated line
60	86AQV2//GEMS-0227/42T2	1257	1294	283	110	SS	Company 42 donated line
61	87DIA4//GEMS-0227/42T2	1338	1350	300	105	SS	Company 42 donated line
62	WDHQ2//GEMS-0227/42T2	1412	1424	310	128	SS	Company 42 donated line
63	01DIB2//GEMS-0227/42T5	1410	1423	310	133	SS	Company 42 donated line
64	17DHD7//GEMS-0227/42T5	1477	1503	305	110	SS	Company 42 donated line
65	PH3DT//GEMS-0227/42T5	1463	1529	318	118	SS	Company 42 donated line
66	GEMN-0325/GEMN-0097	1410	1423	335	143	NSS	GEM/GEM
67	GEMN-0325/GEMN-0267	1451	1437	330	138	NSS	GEM/GEM
68	GEMN-0325/GEMN-0292	1464	1477	318	145	NSS	GEM/GEM
69	GEMN-0325/GEMN-0302	1410	1424	308	113	NSS	GEM/GEM
70	GEMN-0325/GEMN-0310	1477	1477	340	160	NSS	GEM/GEM

Table 12. 2024 Breeding Cross Observations – GEM Ames

Entry	Pedigree	GDU Anthesis	GDU Silking	Plant Height (cm)	Ear Height (cm)	HG	Exotic parentage background
71	GEMS-0066/GEMS-0322	1410	1410	318	128	SS	GEM/GEM
72	GEMS-0226/GEMS-0322	1437	1477	328	148	SS	GEM/GEM
73	GEMS-0326/GEMS-0322	1410	1423	320	138	SS	GEM/GEM
74	GEMS-0328/GEMS-0322	1329	1338	303	115	SS	GEM/GEM
75	GEMS-0329/GEMS-0322	1398	1398	315	120	SS	GEM/GEM
76	4IBZ1A//PH1GD/(GEMN-0254/NX20T0024-B)	1437	1437	300	118	NSS	Novasem donated line; White ETO
77	70LDL5//PH3HH/(GEMN-0254/NX20T0024-B)	1397	1437	323	130	NSS	Novasem donated line; White ETO
78	90LCL6//PH3HH/(GEMN-0254/NX20T0024-B)	1338	1362	310	118	NSS	Novasem donated line; White ETO
79	94INK1A//PH1GD/(GEMN-0254/NX20T0024-B)	1375	1363	300	118	NSS	Novasem donated line; White ETO
80	94INK1A//PH3HH/(GEMN-0254/NX20T0024-B)	1362	1412	298	100	NSS	Novasem donated line; White ETO
81	PH50P//PH1GD/(GEMN-0254/NX20T0024-B)	1385	1410	288	110	NSS	Novasem donated line; White ETO
82	PH50P//PH3HH/(GEMN-0254/NX20T0024-B)	1373	1362	313	125	NSS	Novasem donated line; White ETO
83	01HGI2//PH04G/(GEMN-0157/NX20T0039-B)	1338	1373	305	125	NSS	Novasem donated line; White ETO
84	PH3HH//PH04G/(GEMN-0157/NX20T0039-B)	1398	1451	288	105	NSS	Novasem donated line; White ETO
85	PH51H//PH04G/(GEMN-0157/NX20T0039-B)	1326	1362	315	115	NSS	Novasem donated line; White ETO
86	17INI20//PH50P/(GEMN-0207/NX20T0041-B)	1410	1424	290	123	NSS	Novasem donated line; White ETO
87	17INI30//PH50P/(GEMN-0207/NX20T0041-B)	1398	1412	308	123	NSS	Novasem donated line; White ETO
88	83INI8//17INI30/(GEMN-0207/NX20T0041-B)	1437	1464	288	115	NSS	Novasem donated line; White ETO
89	86ISI5//17INI30/(GEMN-0207/NX20T0041-B)	1315	1338	298	135	NSS	Novasem donated line; White ETO
90	LH277//PH50P/(GEMN-0207/NX20T0041-B)	1375	1398	300	128	NSS	Novasem donated line; White ETO
91	PH04G//17INI30/(GEMN-0207/NX20T0041-B)	1450	1503	298	128	NSS	Novasem donated line; White ETO
92	PH51H//PH50P/(GEMN-0207/NX20T0041-B)	1373	1410	300	115	NSS	Novasem donated line; White ETO
93	91INH2//PH17C/(GEMN-0238/NX20T0042-B)	1373	1410	328	125	NSS	Novasem donated line; White ETO
94	LH279//PH17C/(GEMN-0238/NX20T0042-B)	1425	1437	308	125	NSS	Novasem donated line; White ETO
95	PH1GD//PH17C/(GEMN-0238/NX20T0042-B)	1329	1350	320	120	NSS	Novasem donated line; White ETO
96	17INI20//01HGI2/(GEMN-0238/NX20T0043-B)	1398	1424	285	110	NSS	Novasem donated line; White ETO
97	17INI20//LH277/(GEMN-0238/NX20T0043-B)	1385	1410	278	105	NSS	Novasem donated line; White ETO
98	17INI30//01HGI2/(GEMN-0238/NX20T0043-B)	1424	1437	275	115	NSS	Novasem donated line; White ETO
99	17INI30//01INL1/(GEMN-0238/NX20T0043-B)	1350	1397	288	113	NSS	Novasem donated line; White ETO
100	17INI30//LH277/(GEMN-0238/NX20T0043-B)	1385	1398	298	118	NSS	Novasem donated line; White ETO
101	4IBZ1A//01INL1/(GEMN-0238/NX20T0043-B)	1385	1437	283	93	NSS	Novasem donated line; White ETO
102	4IBZ1A//LH277/(GEMN-0238/NX20T0043-B)	1410	1451	293	105	NSS	Novasem donated line; White ETO
103	94INK1A//01INL1/(GEMN-0238/NX20T0043-B)	1373	1410	313	120	NSS	Novasem donated line; White ETO
104	PH50P//01INL1/(GEMN-0238/NX20T0043-B)	1315	1326	290	103	NSS	Novasem donated line; White ETO
105	PH51H//01HGI2/(GEMN-0238/NX20T0043-B)	1326	1348	285	120	NSS	Novasem donated line; White ETO

Table 12. 2024 Breeding Cross Observations – GEM Ames

Entry	Pedigree	GDU Anthesis	GDU Silking	Plant Height (cm)	Ear Height (cm)	HG	Exotic parentage background
106	PH51H//LH277/(GEMN-0238/NX20T0043-B)	1350	1362	288	108	NSS	Novasem donated line; White ETO
107	01HGI2//17INI20/(GEMN-0257/NX20T0047-B)	1437	1424	295	103	NSS	Novasem donated line; White ETO
108	83INI14//PH50P/(GEMN-0257/NX20T0047-B)	1437	1464	310	120	NSS	Novasem donated line; White ETO
109	83INI8//PH50P/(GEMN-0257/NX20T0047-B)	1373	1410	313	118	NSS	Novasem donated line; White ETO
110	86ISI5//PH50P/(GEMN-0257/NX20T0047-B)	1285	1348	295	110	NSS	Novasem donated line; White ETO
111	91INH2//17INI20/(GEMN-0257/NX20T0047-B)	1410	1423	275	95	NSS	Novasem donated line; White ETO
112	PH04G//PH50P/(GEMN-0257/NX20T0047-B)	1362	1386	308	118	NSS	Novasem donated line; White ETO
113	PH3HH//17INI20/(GEMN-0257/NX20T0047-B)	1450	1476	295	115	NSS	Novasem donated line; White ETO
114	01INL1//PH0HR/(GEMN-0285/NX20T0048-B)	1363	1400	285	110	NSS	Novasem donated line; White ETO
115	LH277//PH0HR/(GEMN-0285/NX20T0048-B)	1303	1315	295	128	NSS	Novasem donated line; White ETO
116	PH51H//PH0HR/(GEMN-0285/NX20T0048-B)	1319	1341	293	123	NSS	Novasem donated line; White ETO
117	17INI20//PH17C/(GEMN-0286/NX20T0049-B)	1437	1464	308	118	NSS	Novasem donated line; White ETO
118	17INI30//PH17C/(GEMN-0286/NX20T0049-B)	1398	1410	315	123	NSS	Novasem donated line; White ETO
119	4IBZ1A//PH17C/(GEMN-0286/NX20T0049-B)	1412	1424	320	123	NSS	Novasem donated line; White ETO
120	4IBZ1A//PH51H/(GEMN-0270/NX20T0053-B)	1425	1450	305	128	NSS	Novasem donated line; White ETO
121	70LDL5//91INH2/(GEMN-0270/NX20T0053-B)	1423	1437	305	120	NSS	Novasem donated line; White ETO
122	70LDL5//LH279/(GEMN-0270/NX20T0053-B)	1425	1464	308	110	NSS	Novasem donated line; White ETO
123	70LDL5//PH51H/(GEMN-0270/NX20T0053-B)	1373	1423	305	125	NSS	Novasem donated line; White ETO
124	83INI14//91INH2/(GEMN-0270/NX20T0053-B)	1423	1464	295	108	NSS	Novasem donated line; White ETO
125	83INI14//LH279/(GEMN-0270/NX20T0053-B)	1397	1410	328	123	NSS	Novasem donated line; White ETO
126	86ISI5//LH279/(GEMN-0270/NX20T0053-B)	1303	1362	285	113	NSS	Novasem donated line; White ETO
127	90LCL6//91INH2/(GEMN-0270/NX20T0053-B)	1437	1423	325	133	NSS	Novasem donated line; White ETO
128	90LCL6//LH279/(GEMN-0270/NX20T0053-B)	1385	1410	315	135	NSS	Novasem donated line; White ETO
129	94INK1A//PH51H/(GEMN-0270/NX20T0053-B)	1385	1397	315	130	NSS	Novasem donated line; White ETO
130	PH50P//PH51H/(GEMN-0270/NX20T0053-B)	1350	1385	290	108	NSS	Novasem donated line; White ETO
131	01HGI2//94INK1A/(GEMN-0104/NX20T0054-B)	1373	1397	293	110	NSS	Novasem donated line; White ETO
132	01INL1//01HGI4/(GEMN-0104/NX20T0054-B)	1350	1373	305	110	NSS	Novasem donated line; White ETO
133	91INH2//01HGI4/(GEMN-0104/NX20T0054-B)	1385	1398	323	138	NSS	Novasem donated line; White ETO
134	91INH2//94INK1A/(GEMN-0104/NX20T0054-B)	1373	1397	295	95	NSS	Novasem donated line; White ETO
135	LH279//01HGI4/(GEMN-0104/NX20T0054-B)	1385	1424	313	115	NSS	Novasem donated line; White ETO
136	LH279//94INK1A/(GEMN-0104/NX20T0054-B)	1377	1389	305	110	NSS	Novasem donated line; White ETO
137	PH1GD//01HGI4/(GEMN-0104/NX20T0054-B)	1326	1337	300	143	NSS	Novasem donated line; White ETO
138	PH1GD//94INK1A/(GEMN-0104/NX20T0054-B)	1315	1326	313	130	NSS	Novasem donated line; White ETO
139	01HGI2//17INI20/(GEMN-0124/NX20T0055-B)	1398	1398	280	100	NSS	Novasem donated line; White ETO
140	01HGI2//PH03D/(GEMN-0124/NX20T0055-B)	1284	1315	298	108	NSS	Novasem donated line; White ETO

Table 12. 2024 Breeding Cross Observations – GEM Ames

Entry	Pedigree	GDU Anthesis	GDU Silking	Plant Height (cm)	Ear Height (cm)	HG	Exotic parentage background
141	91INH2//17INI20/(GEMN-0124/NX20T0055-B)	1373	1397	265	88	NSS	Novasem donated line; White ETO
142	91INH2//PH03D/(GEMN-0124/NX20T0055-B)	1385	1410	313	123	NSS	Novasem donated line; White ETO
143	LH279//17INI20/(GEMN-0124/NX20T0055-B)	1362	1350	295	113	NSS	Novasem donated line; White ETO
144	PH04G//PH03D/(GEMN-0124/NX20T0055-B)	1397	1451	320	128	NSS	Novasem donated line; White ETO
145	PH3HH//PH03D/(GEMN-0124/NX20T0055-B)	1398	1464	298	100	NSS	Novasem donated line; White ETO
146	17INI20//01INL1/(GEMN-0097/NX20T0066-B)	1373	1362	290	118	NSS	Novasem donated line; White ETO
147	17INI30//01INL1/(GEMN-0097/NX20T0066-B)	1373	1397	293	103	NSS	Novasem donated line; White ETO
148	4IBZ1A//01INL1/(GEMN-0097/NX20T0066-B)	1373	1410	300	105	NSS	Novasem donated line; White ETO
149	83INI14//01HGI2/(GEMN-0097/NX20T0066-B)	1385	1398	300	105	NSS	Novasem donated line; White ETO
150	86ISI5//01HGI2/(GEMN-0097/NX20T0066-B)	1275	1303	295	123	NSS	Novasem donated line; White ETO
151	90LCL6//01HGI2/(GEMN-0097/NX20T0066-B)	1385	1410	308	128	NSS	Novasem donated line; White ETO
152	PH50P//01INL1/(GEMN-0097/NX20T0066-B)	1294	1315	310	118	NSS	Novasem donated line; White ETO
153	01INL1//LH279/(GEMN-0178/NX20T0072-B)	1373	1385	298	125	NSS	Novasem donated line; White ETO
154	01INL1//PH51H/(GEMN-0178/NX20T0072-B)	1338	1362	278	98	NSS	Novasem donated line; White ETO
155	01INL1//PH51H/(GEMN-0178/NX20T0072-B)	1303	1303	290	105	NSS	Novasem donated line; White ETO
156	17INI20//PH51H/(GEMN-0178/NX20T0072-B)	1338	1363	283	105	NSS	Novasem donated line; White ETO
157	LH277//LH279/(GEMN-0178/NX20T0072-B)	1385	1375	303	123	NSS	Novasem donated line; White ETO
158	LH277//PH51H/(GEMN-0178/NX20T0072-B)	1326	1337	275	103	NSS	Novasem donated line; White ETO
159	PH1GD//LH279/(GEMN-0178/NX20T0072-B)	1326	1315	308	123	NSS	Novasem donated line; White ETO
160	01HGI2//94INK1A/(GEMN-0272/NX20T0075-B)	1303	1285	323	125	NSS	Novasem donated line; White ETO
161	83INI14//17INI30/(GEMN-0272/NX20T0075-B)	1424	1437	325	133	NSS	Novasem donated line; White ETO
162	83INI8//17INI30/(GEMN-0272/NX20T0075-B)	1385	1410	310	123	NSS	Novasem donated line; White ETO
163	86ISI5//17INI30/(GEMN-0272/NX20T0075-B)	1276	1306	295	123	NSS	Novasem donated line; White ETO
164	90LCL6//17INI30/(GEMN-0272/NX20T0075-B)	1284	1275	305	115	NSS	Novasem donated line; White ETO
165	91INH2//94INK1A/(GEMN-0272/NX20T0075-B)	1338	1385	328	125	NSS	Novasem donated line; White ETO
166	LH279//94INK1A/(GEMN-0272/NX20T0075-B)	1326	1326	318	123	NSS	Novasem donated line; White ETO
167	PH3HH//94INK1A/(GEMN-0272/NX20T0075-B)	1398	1424	353	160	NSS	Novasem donated line; White ETO
168	01INL1//PH1GD/(GEMN-0287/NX20T0080-B)	1385	1410	273	98	NSS	Novasem donated line; White ETO
169	70LDL5//PH3HH/(GEMN-0287/NX20T0080-B)	1385	1410	310	118	NSS	Novasem donated line; White ETO
170	83INI14//PH3HH/(GEMN-0287/NX20T0080-B)	1437	1477	305	118	NSS	Novasem donated line; White ETO
171	83INI8//PH51H/(GEMN-0287/NX20T0080-B)	1373	1410	310	125	NSS	Novasem donated line; White ETO
172	90LCL6//PH3HH/(GEMN-0287/NX20T0080-B)	1350	1375	318	128	NSS	Novasem donated line; White ETO
173	94INK1A//PH3HH/(GEMN-0287/NX20T0080-B)	1373	1437	315	125	NSS	Novasem donated line; White ETO
174	LH279//PH1GD/(GEMN-0287/NX20T0080-B)	1385	1397	298	115	NSS	Novasem donated line; White ETO
175	PH04G//PH51H/(GEMN-0287/NX20T0080-B)	1424	1503	325	133	NSS	Novasem donated line; White ETO

Table 12. 2024 Breeding Cross Observations – GEM Ames

Entry	Pedigree	GDU Anthesis	GDU Silking	Plant Height (cm)	Ear Height (cm)	HG	Exotic parentage background
176	PH3HH//PH51H/(GEMN-0287/NX20T0080-B)	1410	1464	295	108	NSS	Novasem donated line; White ETO
177	PH51H//PH1GD/(GEMN-0287/NX20T0080-B)	1373	1397	273	103	NSS	Novasem donated line; White ETO
178	01HGI2//4IBZ1A/(GEMN-0302/NX20T0087-B)	1373	1397	300	110	NSS	Novasem donated line; White ETO
179	83INI14//17INI20/(GEMN-0302/NX20T0087-B)	1385	1410	285	115	NSS	Novasem donated line; White ETO
180	83INI8//17INI20/(GEMN-0302/NX20T0087-B)	1385	1410	300	110	NSS	Novasem donated line; White ETO
181	83INI8//4IBZ1A/(GEMN-0302/NX20T0087-B)	1397	1410	310	108	NSS	Novasem donated line; White ETO
182	83INI8//PH50P/(GEMN-0302/NX20T0087-B)	1385	1410	300	115	NSS	Novasem donated line; White ETO
183	86ISI5//17INI20/(GEMN-0302/NX20T0087-B)	1267	1303	285	105	NSS	Novasem donated line; White ETO
184	86ISI5//PH50P/(GEMN-0302/NX20T0087-B)	1259	1268	290	125	NSS	Novasem donated line; White ETO
185	PH04G//4IBZ1A/(GEMN-0302/NX20T0087-B)	1412	1450	318	128	NSS	Novasem donated line; White ETO
186	PH04G//PH50P/(GEMN-0302/NX20T0087-B)	1385	1450	315	118	NSS	Novasem donated line; White ETO
187	PH3HH//4IBZ1A/(GEMN-0302/NX20T0087-B)	1423	1437	300	105	NSS	Novasem donated line; White ETO
188	PH3HH//PH50P/(GEMN-0302/NX20T0087-B)	1398	1423	303	103	NSS	Novasem donated line; White ETO
189	PH50P//17INI20/(GEMN-0302/NX20T0087-B)	1294	1294	300	113	NSS	Novasem donated line; White ETO
190	09DSQ1//90DJD28/(GEMS-0275/NX20T0027-B)	1423	1490	303	118	SS	Novasem donated line; White Tuxpeño
191	17DHD7//90DJD28/(GEMS-0275/NX20T0027-B)	1424	1464	283	110	SS	Novasem donated line; White Tuxpeño
192	22DHQ3//LH303/(GEMS-0275/NX20T0027-B)	1412	1437	330	130	SS	Novasem donated line; White Tuxpeño
193	4SCQ3//LH303/(GEMS-0275/NX20T0027-B)	1373	1410	303	118	SS	Novasem donated line; White Tuxpeño
194	PH2JR//LH303/(GEMS-0275/NX20T0027-B)	1424	1464	298	108	SS	Novasem donated line; White Tuxpeño
195	PH3DT//90DJD28/(GEMS-0275/NX20T0027-B)	1516	1540	293	115	SS	Novasem donated line; White Tuxpeño
196	WDHQ11//LH303/(GEMS-0275/NX20T0027-B)	1437	1450	310	128	SS	Novasem donated line; White Tuxpeño
197	01DIB2//LH303/(GEMS-0294/NX20T0028-B)	1350	1363	293	123	SS	Novasem donated line; White Tuxpeño
198	17DHD16//LH303/(GEMS-0294/NX20T0028-B)	1423	1450	293	118	SS	Novasem donated line; White Tuxpeño
199	17QFB1//LH303/(GEMS-0294/NX20T0028-B)	1410	1424	308	128	SS	Novasem donated line; White Tuxpeño
200	87DIA4//LH303/(GEMS-0294/NX20T0028-B)	1337	1326	300	128	SS	Novasem donated line; White Tuxpeño
201	90DJD28//17QFB1/(GEMS-0294/NX20T0028-B)	1476	1489	315	120	SS	Novasem donated line; White Tuxpeño
202	LH303//17QFB1/(GEMS-0294/NX20T0028-B)	1363	1398	295	115	SS	Novasem donated line; White Tuxpeño
203	PHJ8R//17QFB1/(GEMS-0294/NX20T0028-B)	1423	1450	298	123	SS	Novasem donated line; White Tuxpeño
204	WDHQ2//17QFB1/(GEMS-0294/NX20T0028-B)	1437	1450	313	130	SS	Novasem donated line; White Tuxpeño
205	01DIB2//22DHQ3/(GEMS-0113/NX20T0030-B)	1363	1375	308	133	SS	Novasem donated line; White Tuxpeño
206	09DSQ1//17DHD16/(GEMS-0113/NX20T0030-B)	1424	1424	303	125	SS	Novasem donated line; White Tuxpeño
207	17DHD16//22DHQ3/(GEMS-0113/NX20T0030-B)	1424	1437	290	110	SS	Novasem donated line; White Tuxpeño
208	17DHD7//17DHD16/(GEMS-0113/NX20T0030-B)	1412	1424	288	113	SS	Novasem donated line; White Tuxpeño
209	22DHQ3//87DIA4/(GEMS-0113/NX20T0030-B)	1385	1410	330	135	SS	Novasem donated line; White Tuxpeño
210	4SCQ3//87DIA4/(GEMS-0113/NX20T0030-B)	1303	1350	308	128	SS	Novasem donated line; White Tuxpeño

Table 12. 2024 Breeding Cross Observations – GEM Ames

Entry	Pedigree	GDU Anthesis	GDU Silking	Plant Height (cm)	Ear Height (cm)	HG	Exotic parentage background
211	90DJD28//22DHQ3/(GEMS-0113/NX20T0030-B)	1398	1423	320	133	SS	Novasem donated line; White Tuxpeño
212	LH303//22DHQ3/(GEMS-0113/NX20T0030-B)	1398	1424	308	120	SS	Novasem donated line; White Tuxpeño
213	PH3DT//17DHD16/(GEMS-0113/NX20T0030-B)	1425	1437	285	110	SS	Novasem donated line; White Tuxpeño
214	PHJ8R//87DIA4/(GEMS-0113/NX20T0030-B)	1361	1362	323	133	SS	Novasem donated line; White Tuxpeño
215	WDHQ2//87DIA4/(GEMS-0113/NX20T0030-B)	1361	1362	305	135	SS	Novasem donated line; White Tuxpeño
216	01DIB2//WDHQ11/(GEMS-0142/NX20T0031-B)	1373	1397	298	118	SS	Novasem donated line; White Tuxpeño
217	17DHD16//87DIA4/(GEMS-0142/NX20T0031-B)	1385	1410	278	103	SS	Novasem donated line; White Tuxpeño
218	17DHD16//WDHQ11/(GEMS-0142/NX20T0031-B)	1423	1451	293	110	SS	Novasem donated line; White Tuxpeño
219	17QFB1//87DIA4/(GEMS-0142/NX20T0031-B)	1385	1398	293	108	SS	Novasem donated line; White Tuxpeño
220	17QFB1//PH2JR/(GEMS-0142/NX20T0031-B)	1385	1437	295	108	SS	Novasem donated line; White Tuxpeño
221	17QFB1//WDHQ11/(GEMS-0142/NX20T0031-B)	1450	1477	333	140	SS	Novasem donated line; White Tuxpeño
222	79314N1//PH2JR/(GEMS-0142/NX20T0031-B)	1463	1476	300	133	SS	Novasem donated line; White Tuxpeño
223	87DIA4//PH2JR/(GEMS-0142/NX20T0031-B)	1373	1362	300	118	SS	Novasem donated line; White Tuxpeño
224	87DIA4//WDHQ11/(GEMS-0142/NX20T0031-B)	1284	1331	300	118	SS	Novasem donated line; White Tuxpeño
225	PH3DT//87DIA4/(GEMS-0142/NX20T0031-B)	1423	1437	290	108	SS	Novasem donated line; White Tuxpeño
226	01DIB2//PHKV0/(GEMS-0281/NX20T0032-B)	1373	1337	303	130	SS	Novasem donated line; White Tuxpeño
227	90DJD28//PHKV0/(GEMS-0281/NX20T0032-B)	1410	1423	315	130	SS	Novasem donated line; White Tuxpeño
228	LH303//PHKV0/(GEMS-0281/NX20T0032-B)	1410	1412	310	120	SS	Novasem donated line; White Tuxpeño
229	17DHD16//PHKV0/(GEMS-0284/NX20T0034-B)	1361	1315	298	115	SS	Novasem donated line; White Tuxpeño
230	17QFB1//PHKV0/(GEMS-0284/NX20T0034-B)	1375	1363	298	108	SS	Novasem donated line; White Tuxpeño
231	87DIA4//PHKV0/(GEMS-0284/NX20T0034-B)	1303	1294	298	125	SS	Novasem donated line; White Tuxpeño
232	79314N1//PH09B/(GEMS-0307/NX20T0035-B)	1423	1437	310	130	SS	Novasem donated line; White Tuxpeño
233	86AQV2//PH09B/(GEMS-0307/NX20T0035-B)	1285	1317	305	123	SS	Novasem donated line; White Tuxpeño
234	F351//PH09B/(GEMS-0307/NX20T0035-B)	1424	1450	308	128	SS	Novasem donated line; White Tuxpeño
235	01DIB2//17DHD16/(GEMS-0311/NX20T0037-B)	1389	1390	305	120	SS	Novasem donated line; White Tuxpeño
236	09DSQ1//17QFB1/(GEMS-0311/NX20T0037-B)	1424	1477	308	115	SS	Novasem donated line; White Tuxpeño
237	17DHD16//17DHD16/(GEMS-0311/NX20T0037-B)	1423	1464	288	105	SS	Novasem donated line; White Tuxpeño
238	17DHD7//17QFB1/(GEMS-0311/NX20T0037-B)	1410	1451	285	115	SS	Novasem donated line; White Tuxpeño
239	17QFB1//17DHD16/(GEMS-0311/NX20T0037-B)	1397	1423	303	110	SS	Novasem donated line; White Tuxpeño
240	79314N1//90DJD28/(GEMS-0311/NX20T0037-B)	1437	1451	300	123	SS	Novasem donated line; White Tuxpeño
241	86AQV2//90DJD28/(GEMS-0311/NX20T0037-B)	1231	1259	295	120	SS	Novasem donated line; White Tuxpeño
242	87DIA4//17DHD16/(GEMS-0311/NX20T0037-B)	1397	1423	293	115	SS	Novasem donated line; White Tuxpeño
243	F351//90DJD28/(GEMS-0311/NX20T0037-B)	1477	1503	303	135	SS	Novasem donated line; White Tuxpeño
244	PH2JR//17QFB1/(GEMS-0311/NX20T0037-B)	1463	1490	288	113	SS	Novasem donated line; White Tuxpeño
245	PH3DT//90DJD28/(GEMS-0311/NX20T0037-B)	1450	1463	298	118	SS	Novasem donated line; White Tuxpeño

Table 12. 2024 Breeding Cross Observations – GEM Ames

Entry	Pedigree	GDU Anthesis	GDU Silking	Plant Height (cm)	Ear Height (cm)	HG	Exotic parentage background
246	WDHQ11//17QFB1/(GEMS-0311/NX20T0037-B)	1463	1516	303	113	SS	Novasem donated line; White Tuxpeño
247	09DSQ1//4SCQ3/(GEMS-0312/NX20T0038-B)	1437	1423	298	123	SS	Novasem donated line; White Tuxpeño
248	17DHD7//4SCQ3/(GEMS-0312/NX20T0038-B)	1385	1437	305	130	SS	Novasem donated line; White Tuxpeño
249	22DHQ3//17DHD16/(GEMS-0312/NX20T0038-B)	1423	1477	278	108	SS	Novasem donated line; White Tuxpeño
250	79314N1//22DHQ3/(GEMS-0312/NX20T0038-B)	1424	1450	315	128	SS	Novasem donated line; White Tuxpeño
251	86AQV2//22DHQ3/(GEMS-0312/NX20T0038-B)	1267	1276	303	125	SS	Novasem donated line; White Tuxpeño
252	90DJD28//17QFB1/(GEMS-0312/NX20T0038-B)	1437	1463	320	135	SS	Novasem donated line; White Tuxpeño
253	F351//22DHQ3/(GEMS-0312/NX20T0038-B)	1477	1516	320	135	SS	Novasem donated line; White Tuxpeño
254	LH303//17QFB1/(GEMS-0312/NX20T0038-B)	1354	1354	308	130	SS	Novasem donated line; White Tuxpeño
255	PH2JR//17DHD16/(GEMS-0312/NX20T0038-B)	1424	1437	275	108	SS	Novasem donated line; White Tuxpeño
256	PH2JR//4SCQ3/(GEMS-0312/NX20T0038-B)	1398	1424	298	105	SS	Novasem donated line; White Tuxpeño
257	PH3DT//22DHQ3/(GEMS-0312/NX20T0038-B)	1424	1464	303	118	SS	Novasem donated line; White Tuxpeño
258	PHJ8R//17QFB1/(GEMS-0312/NX20T0038-B)	1424	1477	315	128	SS	Novasem donated line; White Tuxpeño
259	WDHQ11//17DHD16/(GEMS-0312/NX20T0038-B)	1424	1424	308	128	SS	Novasem donated line; White Tuxpeño
260	WDHQ11//4SCQ3/(GEMS-0312/NX20T0038-B)	1423	1464	310	113	SS	Novasem donated line; White Tuxpeño
261	WDHQ2//17QFB1/(GEMS-0312/NX20T0038-B)	1424	1450	308	128	SS	Novasem donated line; White Tuxpeño
262	01DIB2//17DHD16/(GEMS-0093/NX20T0050-B)	1326	1306	305	133	SS	Novasem donated line; White Tuxpeño
263	22DHQ3//17QFB1/(GEMS-0093/NX20T0050-B)	1385	1437	323	138	SS	Novasem donated line; White Tuxpeño
264	4SCQ3//17QFB1/(GEMS-0093/NX20T0050-B)	1398	1437	295	108	SS	Novasem donated line; White Tuxpeño
265	4SCQ3//WDHQ2/(GEMS-0093/NX20T0050-B)	1423	1437	288	110	SS	Novasem donated line; White Tuxpeño
266	90DJD28//17DHD16/(GEMS-0093/NX20T0050-B)	1423	1437	323	143	SS	Novasem donated line; White Tuxpeño
267	LH303//17DHD16/(GEMS-0093/NX20T0050-B)	1386	1400	308	123	SS	Novasem donated line; White Tuxpeño
268	PH2JR//17QFB1/(GEMS-0093/NX20T0050-B)	1464	1477	290	110	SS	Novasem donated line; White Tuxpeño
269	PH3DT//WDHQ2/(GEMS-0093/NX20T0050-B)	1450	1450	300	123	SS	Novasem donated line; White Tuxpeño
270	PHJ8R//WDHQ2/(GEMS-0093/NX20T0050-B)	1398	1450	303	123	SS	Novasem donated line; White Tuxpeño
271	WDHQ11//17QFB1/(GEMS-0093/NX20T0050-B)	1451	1464	298	100	SS	Novasem donated line; White Tuxpeño
272	01DIB2//PHJ8R/(GEMS-0255/NX20T0051-B)	1412	1398	295	123	SS	Novasem donated line; White Tuxpeño
273	01INL1//PH09B/(GEMS-0255/NX20T0051-B)	1385	1423	308	120	SS	Novasem donated line; White Tuxpeño
274	4SCQ3//87DIA4/(GEMS-0255/NX20T0051-B)	1410	1423	293	120	SS	Novasem donated line; White Tuxpeño
275	90DJD28//PHJ8R/(GEMS-0255/NX20T0051-B)	1424	1451	308	128	SS	Novasem donated line; White Tuxpeño
276	LH277//PH09B/(GEMS-0255/NX20T0051-B)	1338	1398	300	110	SS	Novasem donated line; White Tuxpeño
277	LH279//PH09B/(GEMS-0255/NX20T0051-B)	1385	1410	308	123	SS	Novasem donated line; White Tuxpeño
278	LH303//PHJ8R/(GEMS-0255/NX20T0051-B)	1423	1451	310	123	SS	Novasem donated line; White Tuxpeño
279	PH1GD//PH09B/(GEMS-0255/NX20T0051-B)	1257	1294	315	123	SS	Novasem donated line; White Tuxpeño
280	PHJ8R//87DIA4/(GEMS-0255/NX20T0051-B)	1410	1437	298	118	SS	Novasem donated line; White Tuxpeño

Table 12. 2024 Breeding Cross Observations – GEM Ames

Entry	Pedigree	GDU Anthesis	GDU Silking	Plant Height (cm)	Ear Height (cm)	HG	Exotic parentage background
281	WDHQ2//87DIA4/(GEMS-0255/NX20T0051-B)	1410	1437	315	118	SS	Novasem donated line; White Tuxpeño
282	22DHQ3//17QFB1/(GEMS-0050/NX20T0060-B)	1398	1410	313	120	SS	Novasem donated line; White Tuxpeño
283	22DHQ3//PHAG6/(GEMS-0050/NX20T0060-B)	1423	1451	273	108	SS	Novasem donated line; White Tuxpeño
284	4SCQ3//17QFB1/(GEMS-0050/NX20T0060-B)	1373	1423	295	110	SS	Novasem donated line; White Tuxpeño
285	79314N1//17DHD16/(GEMS-0050/NX20T0060-B)	1503	1476	300	115	SS	Novasem donated line; White Tuxpeño
286	86AQV2//17DHD16/(GEMS-0050/NX20T0060-B)	1303	1311	293	120	SS	Novasem donated line; White Tuxpeño
287	F351//17DHD16/(GEMS-0050/NX20T0060-B)	1450	1451	300	130	SS	Novasem donated line; White Tuxpeño
288	PH2JR//PHAG6/(GEMS-0050/NX20T0060-B)	1476	1489	268	98	SS	Novasem donated line; White Tuxpeño
289	PHJ8R//17QFB1/(GEMS-0050/NX20T0060-B)	1437	1463	303	133	SS	Novasem donated line; White Tuxpeño
290	WDHQ11//PHAG6/(GEMS-0050/NX20T0060-B)	1424	1437	278	113	SS	Novasem donated line; White Tuxpeño
291	WDHQ2//17QFB1/(GEMS-0050/NX20T0060-B)	1398	1424	298	108	SS	Novasem donated line; White Tuxpeño
292	01DIB2//WDHQ11/(GEMS-0115/NX20T0062-B)	1398	1410	288	113	SS	Novasem donated line; White Tuxpeño
293	17DHD16//22DHQ3/(GEMS-0115/NX20T0062-B)	1423	1437	273	98	SS	Novasem donated line; White Tuxpeño
294	17DHD16//WDHQ11/(GEMS-0115/NX20T0062-B)	1424	1450	280	98	SS	Novasem donated line; White Tuxpeño
295	17QFB1//WDHQ2/(GEMS-0115/NX20T0062-B)	1373	1410	305	118	SS	Novasem donated line; White Tuxpeño
296	79314N1//WDHQ2/(GEMS-0115/NX20T0062-B)	1450	1464	315	130	SS	Novasem donated line; White Tuxpeño
297	86AQV2//WDHQ2/(GEMS-0115/NX20T0062-B)	1249	1259	305	115	SS	Novasem donated line; White Tuxpeño
298	87DIA4//WDHQ2/(GEMS-0115/NX20T0062-B)	1350	1375	300	113	SS	Novasem donated line; White Tuxpeño
299	90DJD28//WDHQ11/(GEMS-0115/NX20T0062-B)	1424	1450	293	110	SS	Novasem donated line; White Tuxpeño
300	LH303//WDHQ11/(GEMS-0115/NX20T0062-B)	1375	1386	283	108	SS	Novasem donated line; White Tuxpeño
301	PH2JR//22DHQ3/(GEMS-0115/NX20T0062-B)	1489	1503	273	110	SS	Novasem donated line; White Tuxpeño
302	WDHQ11//22DHQ3/(GEMS-0115/NX20T0062-B)	1437	1464	290	115	SS	Novasem donated line; White Tuxpeño
303	4SCQ3//PH05F/(GEMS-0115/NX20T0063-B)	1424	1410	300	113	SS	Novasem donated line; White Tuxpeño
304	PHJ8R//PH05F/(GEMS-0115/NX20T0063-B)	1410	1423	303	118	SS	Novasem donated line; White Tuxpeño
305	WDHQ2//PH05F/(GEMS-0115/NX20T0063-B)	1397	1410	315	125	SS	Novasem donated line; White Tuxpeño
306	09DSQ1//LH303/(GEMS-0258/NX20T0064-B)	1397	1451	295	105	SS	Novasem donated line; White Tuxpeño
307	09DSQ1//PH2JR/(GEMS-0258/NX20T0064-B)	1412	1464	290	105	SS	Novasem donated line; White Tuxpeño
308	17DHD7//LH303/(GEMS-0258/NX20T0064-B)	1425	1476	290	113	SS	Novasem donated line; White Tuxpeño
309	17DHD7//PH2JR/(GEMS-0258/NX20T0064-B)	1398	1437	283	110	SS	Novasem donated line; White Tuxpeño
310	79314N1//PHJ8R/(GEMS-0258/NX20T0064-B)	1463	1477	318	133	SS	Novasem donated line; White Tuxpeño
311	F351//LH303/(GEMS-0258/NX20T0064-B)	1450	1437	293	115	SS	Novasem donated line; White Tuxpeño
312	F351//PH2JR/(GEMS-0258/NX20T0064-B)	1437	1450	303	120	SS	Novasem donated line; White Tuxpeño
313	F351//PHJ8R/(GEMS-0258/NX20T0064-B)	1451	1477	303	123	SS	Novasem donated line; White Tuxpeño
314	PH3DT//LH303/(GEMS-0258/NX20T0064-B)	1412	1424	295	110	SS	Novasem donated line; White Tuxpeño
315	PH3DT//PH2JR/(GEMS-0258/NX20T0064-B)	1437	1464	295	123	SS	Novasem donated line; White Tuxpeño

Table 12. 2024 Breeding Cross Observations – GEM Ames

Entry	Pedigree	GDU Anthesis	GDU Silking	Plant Height (cm)	Ear Height (cm)	HG	Exotic parentage background
316	PH3DT//PHJ8R/(GEMS-0258/NX20T0064-B)	1437	1490	288	118	SS	Novasem donated line; White Tuxpeño
317	22DHQ3//90DJD28/(GEMS-0258/NX20T0065-B)	1437	1451	320	148	SS	Novasem donated line; White Tuxpeño
318	4SCQ3//90DJD28/(GEMS-0258/NX20T0065-B)	1412	1437	315	128	SS	Novasem donated line; White Tuxpeño
319	90DJD28//PH2JR/(GEMS-0258/NX20T0065-B)	1477	1464	315	135	SS	Novasem donated line; White Tuxpeño
320	LH303//PH2JR/(GEMS-0258/NX20T0065-B)	1424	1437	318	133	SS	Novasem donated line; White Tuxpeño
321	PH2JR//90DJD28/(GEMS-0258/NX20T0065-B)	1529	1555	320	158	SS	Novasem donated line; White Tuxpeño
322	PHJ8R//PH2JR/(GEMS-0258/NX20T0065-B)	1424	1477	305	123	SS	Novasem donated line; White Tuxpeño
323	WDHQ11//90DJD28/(GEMS-0258/NX20T0065-B)	1437	1450	310	130	SS	Novasem donated line; White Tuxpeño
324	WDHQ2//PH2JR/(GEMS-0258/NX20T0065-B)	1397	1437	278	103	SS	Novasem donated line; White Tuxpeño
325	01INL1//PH0KT/(GEMN-0272/NX20T0079-B)	1373	1397	303	125	NSS	Novasem donated line; Yellow Oh43 Adapted Line
326	LH277//PH0KT/(GEMN-0272/NX20T0079-B)	1338	1377	300	110	NSS	Novasem donated line; Yellow Oh43 Adapted Line
327	PH04G//01INL1/(GEMN-0272/NX20T0079-B)	1398	1423	305	120	NSS	Novasem donated line; Yellow Oh43 Adapted Line
328	PH1GD//01INL1/(GEMN-0272/NX20T0079-B)	1284	1296	310	125	NSS	Novasem donated line; Yellow Oh43 Adapted Line
329	PH1GD//PH0KT/(GEMN-0272/NX20T0079-B)	1276	1296	315	125	NSS	Novasem donated line; Yellow Oh43 Adapted Line
330	PH3HH//01INL1/(GEMN-0272/NX20T0079-B)	1385	1423	303	113	NSS	Novasem donated line; Yellow Oh43 Adapted Line
331	PH51H//01INL1/(GEMN-0272/NX20T0079-B)	1275	1287	280	113	NSS	Novasem donated line; Yellow Oh43 Adapted Line
332	PH51H//PH0KT/(GEMN-0272/NX20T0079-B)	1294	1306	308	110	NSS	Novasem donated line; Yellow Oh43 Adapted Line
333	70LDL5//PH04G/(GEMN-0302/NX20T0088-B)	1385	1410	300	108	NSS	Novasem donated line; Yellow Oh43 Adapted Line
334	94INK1A//PH04G/(GEMN-0302/NX20T0088-B)	1326	1337	313	120	NSS	Novasem donated line; Yellow Oh43 Adapted Line
335	PH50P//PH04G/(GEMN-0302/NX20T0088-B)	1350	1398	303	115	NSS	Novasem donated line; Yellow Oh43 Adapted Line
336	W4240	1289	1294	284	108	Check	104 RM; Wyffels
337	P0589	1269	1252	287	98	Check	105 RM; Corteva
338	W5510	1342	1300	287	98	Check	107 RM; Wyffels
339	MBS3628/MBS9530	1295	1287	303	108	Check	108 RM
340	MBS3919/MBS5507	1374	1386	313	136	Check	110 RM
341	W6820	1304	1301	285	103	Check	110 RM; Wyffels
342	P1151	1300	1297	296	100	Check	111 RM; Corteva
343	P1185	1385	1369	281	99	Check	111 RM; Corteva
344	W7870	1381	1362	296	107	Check	113 RM; Wyffels

Table 13. 2024 MPG Donated Line Observations – GEM Ames

Entry	Pedigree	GDU Anthesis	GDU Silking	Plant Height (cm)	Ear Height (cm)	HG	Exotic parentage background
1	LH283/MPG6602-B	1437	1437	278	98	NSS	MPG donated inbred
2	LH287/MPG6602-B	1437	1410	278	93	NSS	MPG donated inbred
3	LH293/MPG6602-B	1397	1373	265	85	NSS	MPG donated inbred
4	LH303/MPG6602-B	1410	1412	223	75	NSS	MPG donated inbred
5	MPG6602/01INL1-B	1398	1410	240	83	NSS	MPG donated inbred
6	MPG6602/GEMN-0272-B	1437	1437	283	95	NSS	MPG donated inbred
7	8F196/MDS3501-B	1503	1503	245	88	SS	MPG donated inbred
8	90DJD28/MDS3501-B	1437	1423	235	78	SS	MPG donated inbred
9	GEMS-0115/MDS3501-B	1476	1463	268	100	SS	MPG donated inbred
10	GEMS-0147/MDS3501-B	1463	1476	225	85	SS	MPG donated inbred
11	GEMS-0200/MDS3501-B	1464	1463	243	90	SS	MPG donated inbred
12	GEMS-0226/MDS3501-B	1542	1529	270	95	SS	MPG donated inbred
13	GEMS-0311/MDS3501-B	1503	1529	245	93	SS	MPG donated inbred
14	GEMS-0321/MDS3501-B	1490	1516	255	95	SS	MPG donated inbred
15	PH37C/MDS3501-B	1398	1450	253	83	SS	MPG donated inbred
16	90DJD28	1424	1410	248	68	Check	ex-PVP
17	MBWZ	1581	1581	238	83	Check	ex-PVP
18	PH1BC	1581	1581	240	78	Check	ex-PVP
19	PH1EM	1423	1423	248	78	Check	ex-PVP
20	PHP02	1326	1361	215	70	Check	ex-PVP

Host Plant Resistance

Table 14. 2024 GEM Disease Screening Summary

Entry	Pedigree	*Aflatoxin (ppb)	Fusarium ear rot	Head smut	NLB	SLB	Aflatoxin (mean ppb)	Fumonison (mean ppm)
1	01DIB2			95				
2	01HGI2			93				
3	01HGI4			100				
4	01INL1			100				
5	09DSQ1			95				
6	17DHD16			100				
7	17DHD7			100				
8	17INI20			100				
9	17INI30			100				
10	17QFB1			93				
11	22DHQ3			100				
12	4IBZ1A			88				
13	4SCQ3			100				
14	70LDL5			95				
15	79314N1		4.0	100				
16	83INI14			100				
17	83INI8			95				
18	86AQV2			72				
19	86ISI5			100				
20	87DIA4			100				
21	90DJD28			100				
22	90LCL6			100				
23	91INH2			100				
24	94INK1A			100				
25	F351			100				
26	LH216				4.7	3.5		
27	LH235				4.7	5		
28	LH244				4.6			
29	LH283				6.3	3.8		
30	LH287				7.1			
31	LH291		4.0	80				
32	LH293			63				
33	LH303			100				
34	MBWZ			100				
35	PH03D		4.0	93				
36	PH0KT			92				
37	PH1BC			90				
38	PH42B							
39	PHAG6				4.2	4.5		
40	PHMK0				5.0	6.3		
41	PHP02							
42	PHP38				2.8	6.5		
43	PHR03				3.5	3		
44	PHW52		2.0	94	3.1	3.5		
45	WQCD10		4.0					
46	FAW1430	195						
47	GT603	260						
48	T173	1175						
49	Va35	323						

Table 14. 2024 GEM Disease Screening Summary

Entry	Pedigree	*Aflatoxin (ppb)	Fusarium ear rot	Head smut	NLB	SLB	Aflatoxin (mean ppb)	Fumonison (mean ppm)
50	Mp708	280						
51	CML333	580						
52	NC358	253						
53	Mp717						247	1.2
54	Mp718						92	8.5
55	PHMK0						1007	43.7
56	PHM57						393	22.7
57	PHP60						1747	31.0
58	GEMS-0027	140			4.3	5.0	140	30.4
59	GEMS-0032	10					10	8.1
60	GEMN-0048				7.1	4.8		
61	GEMS-0050				4.6	4.0	277	5.9
62	GEMS-0066			100				
63	GEMS-0067	488						
64	GEMS-0072		4.5	100				
65	GEMN-0097				5.2	2.5	508	21.3
66	GEMN-0137				6.1	4.3		
67	GEMN-0144		4.5	100				
68	GEMN-0178		6.5	95	4.5	5.3		
69	GEMN-0187		3.0	94				
70	GEMN-0192		4.0	92				
71	GEMS-0215				4.5	7.0		
72	GEMS-0220				5.8			
73	GEMS-0226		4.5	100	7.3	6.5		
74	GEMS-0227				4.4			
75	GEMS-0232				5.6	5.5		
76	GEMS-0242						571	4.5
77	GEMS-0243						1447	7.1
78	GEMS-0244						653	23.0
79	GEMS-0245				3.3	5.8	1100	11.6
80	GEMN-0246		5.0	38				
81	GEMN-0249		3.0	65				
82	GEMS-0251		4.5	100				
83	GEMS-0253				4.3	5.0		
84	GEMN-0254				5.4	4.0		
85	GEMS-0255				2.9	4.8		
86	GEMS-0256				3.2	6.3		
87	GEMN-0257				5.2	6.5	340	7.8
88	GEMS-0258				3.0	4.3	1020	15.8
89	GEMN-0259				5.8	4.8		
90	GEMN-0261		4.0	76				
91	GEMS-0264		5.0	100				
92	GEMN-0267		2.0	100				
93	GEMS-0268		5.0	100				
94	GEMN-0270				4.8	6.8		
95	GEMN-0271				6.4	5.8		
96	GEMN-0272		4.0	100	6.9	5.0		
97	GEMS-0273				3.7	4.3	250	8.8
98	GEMS-0274				3.8	4.0	331	7.4

Table 14. 2024 GEM Disease Screening Summary

Entry	Pedigree	*Aflatoxin (ppb)	Fusarium ear rot	Head smut	NLB	SLB	Aflatoxin (mean ppb)	Fumonison (mean ppm)
99	GEMS-0281				5.2	4.5		
100	GEMN-0287		5.5	90	6.1	5.5	370	25.3
101	GEMN-0292				4.7	7.0		
102	GEMS-0293		6.0	100	6.3	5.8	1447	7.7
103	GEMS-0294				7.3		345	4.6
104	GEMS-0295				4.4	4.0	407	14.8
105	GEMS-0297		4.5	100				
106	GEMS-0298		3.5	100				
107	GEMS-0303			100				
108	GEMS-0304			78				
109	GEMS-0306		5.0	90				
110	GEMS-0307		4.0	100				
111	GEMS-0308		4.5	86				
112	GEMN-0309		3.5	50				
113	GEMN-0310		4.0	78	5.0	7.5	389	11.9
114	GEMS-0311		5.5	100	3.7	6.8		
115	GEMS-0312		3.5	81	5.0	5.5	153	13.5
116	GEMS-0313			100				
117	GEMS-0314		4.5	100			253	7.3
118	GEMS-0315			94			230	63.3
119	GEMS-0316		4.0	100			584	17.7
120	GEMN-0317		4.5	86			507	8.8
121	GEMN-0318		4.0	100			673	58.0
122	GEMN-0319		5.0	90			1314	14.0
123	GEMS-0320		4.0	100	5.3	4.0	1287	16.1
124	GEMS-0321		5.0	100	7.0	5.5	1133	21.3
125	GEMS-0322	733	4.5	93			352	40.5
126	GEMS-0323	1040	3.5	100				
127	GEMS-0324	798	5.0	100			1947	68.3
128	GEMN-0325	2625	5.0	100			2480	15.3
129	GEMS-0326	1465					1143	3.7
130	GEMS-0327	1188		100			3200	20.0
131	GEMS-0328	475	4.5	100			575	31.7
132	GEMS-0329	1820	4.5	100			622	18.3
133	GEMS-0330		4.0	100	3.8	4.0		
134	GEMN-0331		5.5	89	4.5	5.8		
135	GEMS-0332			94	4.8	3.0		
136	GEMS-0333		4.5	75	4.3	5.5		
137	GEMS-0334		5.5	100				
138	GEMS-0335		3.0	100				
139	GEMS-0336		3.0	100				
140	GEMN-0337							
141	GEMS-0338							
142	GEMS-0339							
143	GEMS-0340		4.5	92				
144	GEMS-0341		5.0	93				
145	GEMN-0342		4.0	100				
146	8F196/MDS3501-B		5.0	95				
147	90DJD28/MDS3501-B		4.0	73				

Table 14. 2024 GEM Disease Screening Summary

Entry	Pedigree	*Aflatoxin (ppb)	Fusarium ear rot	Head smut	NLB	SLB	Aflatoxin (mean ppb)	Fumonison (mean ppm)
148	GEMS-0115/MDS3501-B		5.0	100				
149	GEMS-0147/MDS3501-B		5.5	100				
150	GEMS-0200/MDS3501-B		4.0	100				
151	GEMS-0226/MDS3501-B		5.0	88				
152	GEMS-0311/MDS3501-B		4.5	89				
153	GEMS-0321/MDS3501-B		4.5	100				
154	LH283/MPG6602-B		2.5	90				
155	LH287/MPG6602-B		4.0	100				
156	LH293/MPG6602-B		3.0	70				
157	LH303/MPG6602-B		4.5	100				
158	MPG6602/01INL1-B		3.5	90				
159	MPG6602/GEMN-0272-B		4.0	95				
160	PH37C/MDS3501-B		4.0					

Legend:

Fusarium Ear Rot: 1-9, 9 = best

Heat Smut: % of plants without smut

Northern Leaf Blight: 1-9, 9 = best; average of three ratings taken in September in Laurel Springs, NC (two rep trial).

Southern Leaf Blight: 1-9, 9 = best; one rating taken in August in Clayton, NC (two rep trial).

*Aflatoxin levels were quantified with artificial inoculation. Ten inoculated corn ears were harvested per plot, and the ground corn samples from each plot were quantified for aflatoxin level using Afla-Test. Evaluation performed in Tifton, GA.

Aflatoxin (mean ppb) and Fumonison (mean ppm) were evaluated in Starkville, MS in a single location with three replications.

Table 15. 2024 GEM Insect Feeding Summary

Entry	Pedigree	FAW Feeding Score	FAW damage rating (mean)	Corn Earworm Damage (cm)
1	GEMS-0067		2.1	1.3
2	GEMN-0135	7.0		
3	GEMN-0136	6.0		
4	GEMN-0155	7.6		
5	GEMN-0259	6.3		
6	GEMN-0292	6.6		
7	GEMN-0331	6.2		
8	GEMS-0215	5.7		
9	GEMS-0256	6.6		
10	GEMS-0268	6.7		
11	GEMS-0269	6.6		
12	GEMS-0300	6.5		
13	GEMS-0301	6.7		
14	GEMS-0312	6.6		
15	GEMS-0322		1.8	3.2
16	GEMS-0323		1.4	4.3
17	GEMS-0324		1.7	1.9
18	GEMN-0325		1.9	1.8
19	GEMS-0326		1.1	1.8
20	GEMS-0327		1.6	3.8
21	GEMS-0328		1.6	4.8
22	GEMS-0329		1.2	2.6
23	GEMS-0330	6.0		
24	GEMS-0332	6.4		
25	GEMS-0333	6.5		
26	PHW79	6.4		
27	PHJ31	6.5		
28	T173	6.3	1.8	2.2
29	B73	6.8		
30	Ab24E	6.5		
31	SC212M	5.6		
32	SC229	6.5		
33	Tx601	6.2		
34	Va35	7.1	2.0	0.9
35	Mp707	4.2		
36	Mp708	4.3	1.0	4.4
37	Mp713	4.8		
38	Mp714	3.3		
39	Mp716	3.9		
40	FAW1430		1.0	1.9
41	GT603		1.6	2.1
42	CML333		1.4	1.6
43	NC358		1.8	0.6

Legend: FAW = Fall Armyworm

Fall Armyworm Feeding Score: Lower = better. Evaluations conducted in Starkville, MS in 2024.

Fall Armyworm Damage Rating: Assessed with artificial infestation with 25-30 neonate larvae per plant at 6-leaf (V6) stage. The damage by fall armyworm was rated using a 1-9 scale (1= nodamage, 9 = completely defoliated). Evaluations conducted in Tifton, GA.

Corn Earworm Damage: Assessed using worm penetration (cm) in a corn ear. Evaluations conducted in Tifton, GA.

Yield Trials

Table 16. 2024 GEM Raleigh Yield Trial Summary

Experiment	Material	Tester	Entries	Locations	Plots	Usable Reps
24NCG01	Various exotic x SSS combinations and GEMS releases	MBS6717	35	15	525	12
24NCG02	Various exotic x SSS combinations and GEMS releases	MBS8731	39	15	585	13
24NCG03	GEMS-0255/GEMS-0115, GEMS-0293/GEMS-0281,GEMS-0281/GEMS-0311 and GEMS releases	MBS6717	55	15	825	12
24NCG04	GEMS-0255/GEMS-0115, GEMS-0293/GEMS-0281, GEMS-0281/GEMS-0311 and GEMS releases	MBS8731	55	15	825	12
24NCG05	GEMN x GEMN combinations and GEMN releases	MBS3640GT	16	15	240	13
24NCG06	GEMN x GEMN combinations and GEMN releases	PC2754	18	15	270	14
24NCG07	GEMN releases	MBS3919	22	7	154	5
24NCG08	GEMN-0178/GEMN-0272	MBS3919	73	8	584	6
24NCG09	GEMN-0178/GEMN-0310	MBS3919	39	8	312	5
24NCG10	GEMN-0287/GEMN-0310	PC2754	61	8	488	7
24NCG11	GEMS-0281/GEMS-0312	MBS8731	71	8	568	6
24NCG12	GEMS-0281/GEMS-0312	MBS8731	64	8	512	5
24NCG13	GEMN-0310 derivatives and GEMN-0124/GEMN-0287	PC2754	30	8	240	6
24NCG14	GEMN-0257/GEMN-0272	PC2754	45	5	225	4
24NCG15	La Posta Sequia C7 F71-1-1-1-2-B*4:S40b	MBS8731	29	5	145	5
24NCG16	La Posta Sequia C7 F64-1-1-1-2-B*4:S40b	MBS8731	58	5	290	4
24NCG17	GEMS-0243/PHHB9	MBS8731	77	5	385	4
24NCG18	Population 24 (IST) C2/PHP38	MBS8731	39	5	195	5
24NCG19	ICA 156/PHP38 and JAL167B/PHP38	MBS8731	51	5	255	5
24NCG20	CML274/PHEW7	MBS8731	54	5	270	5
24NCG22	Various exotic x SSS combinations	MBS6717	16	5	80	5
24NCG23	DK_6F545/GEMS-0032 and NC368/GEMS-0032	MBS6717	55	5	275	5
24NCG24	CML449/GEMN-0272	MBS3640GT	53	5	265	4
24NCG25	FL_4BT7/LH216	MBS3640GT	60	5	300	5
24NCG26	CML323/LH214	PC2754	72	5	360	5
24NCG27	Ki45/LH214 and Nei9008/LH214	MBS3919	46	5	230	5
24NCG28	CML323/LH216	PC2754	36	5	180	4
24NCG29	NEI 9008/PHK56	MBS3919	34	5	170	5
24NCG30	Population 32 (IST) C2/GEMN-0097//GEMN-0048, GEMN-0097/Ucayali 12//GEMN-0048, and GEMN-0097/Lima 13//GEMN-0048	PC2754	54	5	270	5
24NCGA1	Derivatives of GEMS-0243, GEMS-0244, GEMS-0311 and GEMS-0312	MBS6717	36	6	216	4
24NCGE1	Exotic inbreds from CIMMYT, Thailand, South Africa	MBS6717	23	6	138	6
24NCGE2	Exotic inbreds from CIMMYT, Thailand, West Africa	PC2754	24	6	144	5
24NCGE3	Exotic inbreds from CIMMYT, Thailand, South Africa	MBS3919	17	6	102	5
24NCGN1	Potential NCSU releases from Goodman's program	MBS6717	18	6	108	5
24NCGN2	Potential NCSU releases from Goodman's program	PC2754	18	6	108	6
24NCGP1	GEMN and GEMS releases	Various ex-PVP combinations	34	6	204	4

Table 17. 2024 GEM Ames 1st Year Yield Trial Summary

Experiment	Material	Tester	Entries	Locations	Plots	Usable Reps	H ² Yield
2413101	CML449/LH82//PHR03; PHN37/CML449//MM501D	PC3565	51	7	357	7	0.90
2413102	F45/DK_HBA1//PHG35	PC3565	51	7	357	7	0.94
2413103	FL_4BT7/LH185//LH168	PC3565	50	7	350	5	0.93
2413104	LH213/AC454//PHN18	PC3565	59	7	413	7	0.94
2413105	PHG39/CML373//WQCD10	PC6567	71	7	497	7	0.80
2413106	3IIH6/GTO 36//LH283; 3IIH6/GTO 36//GEMN-0097	EC001; PC3565	44	6	264	4	0.93
2413107	PHN18/CML349//GEMN-0097; MBWZ/CML349//LH299; LH168/CML349//PH24E; MBWZ/CML311//PHAW6	EC001	122	6	732	4	0.90
2413108	MBWZ/Kei1421//PHK56; LH213/Kei1421//PHBE2; LH213/Kei1421//GEMN-0097	EC001; PC3565	74	6	444	5	0.89
2413109	GEMN-0187/GEMN-0272//GEMN-0192/GEMN-0272-B///GEMN-0287/GEMN-0192//GEMN-0238/GEMN-0177-B:-100-001/4; PHR55/KO301Y//PHAW6; LH213/Ki59//PHBE2	EC001	76	6	456	5	0.91
2413110	MBWZ/Cubano Amarillo-BVIR 102//011BH10; PHK56/Early Carribean-BVIR 139//PHBE2; LH216/Cubano Amarillo-BVIR 102//LH283; MBWZ/Early Carribean-BVIR 139//PHBE2	EC001; PC3565	98	6	588	5	0.87
2413111	MBWZ/CML323//LH168; MBWZ/CML323//PH38B;	EC001; PC3565	80	6	480	5	0.92
2413112	PHJ33/Ki45//LH263; MBWZ/Ki45//PHK56	EC001; PC3565	45	6	270	6	0.94
2413113	HC33/Ki30//WQCD10; HC33/Ki30//PHHB4	MBS8488	57	6	342	5	0.90
2413114	LH204/55T1//WQCD10	MBS8488	104	6	624	4	0.86
2413115	PHW52/55T1//WQCD10	MBS8488	120	6	720	5	0.93
2413116	HC33/55T6//PH42B	MBS8488	61	6	366	5	0.93
2413117	HC33/55T5//PH42B	MBS8488	91	6	546	4	0.85
2413118	HC33/55T5//GEMS-0227	MBS8488	75	6	450	5	0.89
2413119	LH204/Chandelle-BVIR 116//PH42B; GEMS-0002/GEMS-0050//GEMS-0032/GEMS-0072-B///GEMS-0049/GEMS-0235//GEMS-0066/GEMS-0227-B:-044-002/4	MBS8488	52	6	312	6	0.95
2413120	PHHB4/Cargill North Temperate Zone Carribean//PH42B; PHHB4/Cargill North Temperate Zone Carribean//WQCD10	MBS8488	87	6	522	5	0.91
2413121	LH204/KS23SC5//PH42B; PHG39/KS23-6//PHTP9; PHP38/KS23-5//PHTP9	MBS8488	69	6	414	5	0.91
2413122	PHHB9/Ki20//PH42B; LH227/Ki59//PH42B; PHHB9/Ki20//R3212Z	MBS8488	79	6	474	5	0.88

Table 18. GEM Ames 2nd and Released Line Yield Trial Summary

Experiment	Material	Tester	Entries	Locations	Plots	Usable Reps	H ² Yield
2464201	3IIH6/CML311//GEMN-0097; 3IIH6/CML323//GEMN-0302; HBA1/CML323//GEMN-0097; LH168/CML323//LH283; LH213/Ki59//LH283; PHW86/KS23-6//LH283	MBS3640GT; EC001	34	12	408	10	0.94
2464202	3IIH6/CML311//GEMN-0097; 3IIH6/CML323//GEMN-0302; HBA1/CML323//GEMN-0097; LH168/CML323//LH283; LH213/Ki59//LH283; PHW86/KS23-6//LH283; PHW86/KS23-6//PHJ33	PC3565	34	15	510	14	0.94
2464203	GEMS-0227/CML373//FBLL; LH195/CML373//HC33; PHG39/CML373//WQCD10; PHK29/55T3//PHTP9; PHHB4/55T4//LH244	MBS8488	26	16	416	15	0.97
2464204	GEMS-0227/CML373//FBLL; LH195/CML373//HC33; PHG39/CML373//WQCD10; PHHB4/55T4//LH244; PHK29/55T3//PHTP9	PC6567; Q1658	26	16	416	15	0.95
2464205	HC33/Ki30//PH42B; PHG39/KS23-6//GEMS-0147; PHHB9/Ki59//LH244; PHHB9/KS23-6//GEMS-0227; PHK29/KS23-5//WQCD10; LH204/KS23-6//WQCD10	MBS8488; MBS8814	51	15	765	13	0.91
2464206	HC33/Ki30//PH42B; PHG39/KS23-6//GEMS-0147; PHHB9/Ki59//LH244; PHHB9/KS23-6//GEMS-0227; PHK29/KS23-5//WQCD10; LH204/KS23-6//WQCD10	PC6567; Q1658	51	16	816	14	0.90
2464207	CML449/PHN37//3IIH6; Ki43/PHKE6//3IIH6	MBS3640GT	27	12	324	10	0.96
2464208	CML449/PHN37//3IIH6; Ki43/PHKE6//3IIH6	PC3565	27	15	405	13	0.97
2464301	GEM Coded Line Trial	Misc.	46	14	644	12	0.87

Table 19. 2024 GEM Released Line Trial (2464301)

Entry	GEM Line	Tester	%CHK YLD	Yield (bu/ac)	MST	TWT	PLTHT	EARHT
1	GEMS-0313	MBS5507	91	213	15.0	59.3	305	121
2	GEMS-0313	MBS9451	93	218	15.0	56.7	314	125
3	GEMS-0314	PC6567	99	231	16.9	56.6	317	133
4	GEMS-0314	MBS4409	85	200	15.3	58.1	311	123
5	GEMS-0315	MBS5507	91	212	14.9	58.1	308	123
6	GEMS-0322	MBS5507	92	216	14.9	57.7	317	133
7	GEMS-0322	MBS9451	94	220	15.2	57.2	319	127
8	GEMS-0322	PC6567	91	213	15.1	57.6	317	130
9	GEMS-0323	MBS9451	92	216	14.3	56.7	310	123
10	GEMS-0323	MBS5507	93	218	14.5	57.7	310	124
11	GEMS-0324	MBS4409	93	218	15.0	57.6	312	123
12	GEMS-0324	MBS9451	94	221	15.6	55.6	315	122
13	GEMS-0324	MBS5507	90	212	15.7	57.7	316	129
14	GEMS-0324	PC6567	99	232	16.2	57.2	312	129
15	GEMS-0326	MBS9451	98	230	17.2	55.7	311	128
16	GEMS-0326	PC6567	99	231	17.5	57.2	313	131
17	GEMS-0326	MBS5507	95	222	16.9	57.7	314	130
18	GEMS-0327	PC6567	86	202	16.4	57.7	312	120
19	GEMS-0328	MBS4409	86	201	15.0	58.2	306	122
20	GEMS-0328	MBS9451	89	208	15.3	55.5	310	122
21	GEMS-0328	MBS5507	87	203	15.7	57.8	310	122
22	GEMS-0329	MBS5507	98	229	15.1	58.8	319	130
23	GEMN-0317	PC1476	96	224	14.8	57.4	318	128
24	GEMN-0317	PC3565	93	218	14.6	59.2	315	123
25	GEMN-0317	PC2754	97	227	17.1	58.4	318	130
26	GEMN-0317	MBS3628	96	226	15.2	56.9	315	133
27	GEMN-0318	PC2754	101	238	18.8	56.0	315	122
28	GEMN-0318	MBS3628	94	220	16.0	56.1	315	127
29	GEMN-0319	PC3565	87	203	15.6	57.3	308	120
30	GEMN-0319	PC1476	86	201	15.6	56.4	315	125
31	GEMN-0319	MBS3628	96	225	16.3	55.4	313	130
32	GEMN-0319	PC2754	98	230	18.3	55.9	315	129
33	GEMN-0325	PC2754	98	229	18.1	56.3	316	129
34	GEMN-0325	PC1476	89	209	14.6	57.2	317	124
35	GEMN-0325	MBS3628	90	210	16.3	56.3	311	125
36	GEMN-0325	PC3565	91	215	15.4	58.3	307	122
37	GEMN-0325	EC001	88	207	14.0	58.4	308	119

Number of Locations			12	12	12	4	4
Non Check Mean			217.5	15.8	57.2	313	126
Check Mean			234.5	14.9	57.2	305	122
H ²			0.87	0.93	0.94	0.83	0.82

