CONFERENCIA INTERNACIONAL DE ARROZ PARA AMÉRICA LATINA Y EL CARIBE
Innovación para alimentar al mundo
Panamá, 10 al 14 de junio de 2024

Conferencia Internacional de Pyricularia en Arroz y Trigo
Panamá, 10 al 14 de junio de 2024

Estrategias asistidas por genómica para el mejoramiento de arroz

Jérôme Bartholomé

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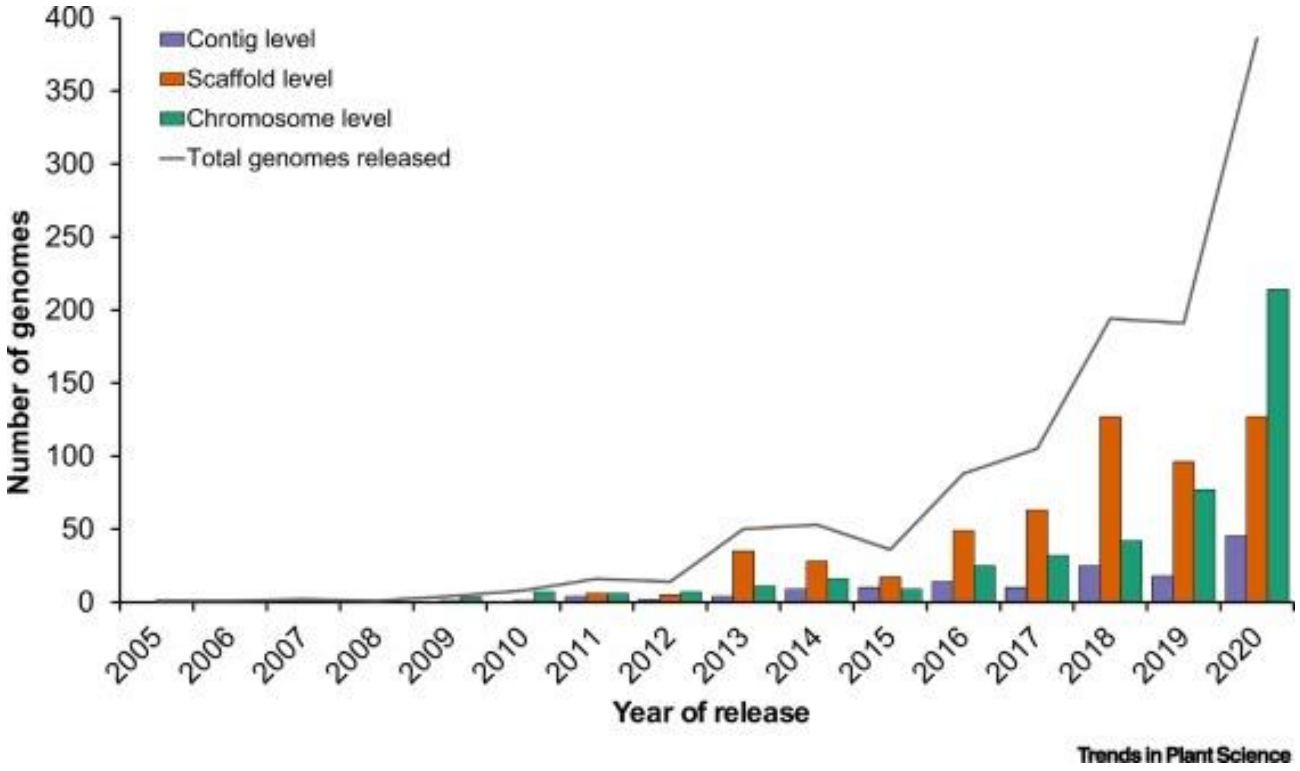
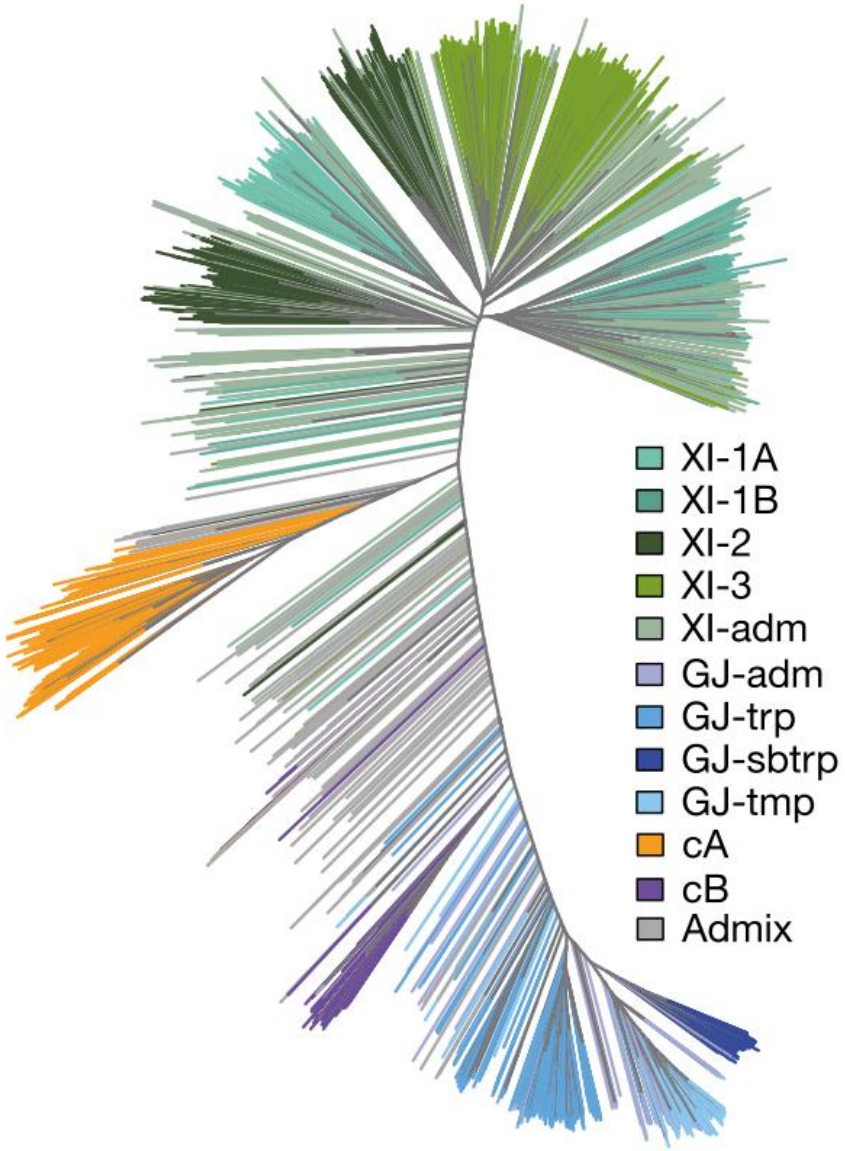


Varshney, R.K et al. (2021). Designing Future Crops: Genomics-Assisted Breeding Comes of Age. Trends in Plant Science 26, 631–649. .



Wang, W *et al.* (2018). "Genomic variation in 3,010 diverse accessions of Asian cultivated rice". Nature **557**, 43–49

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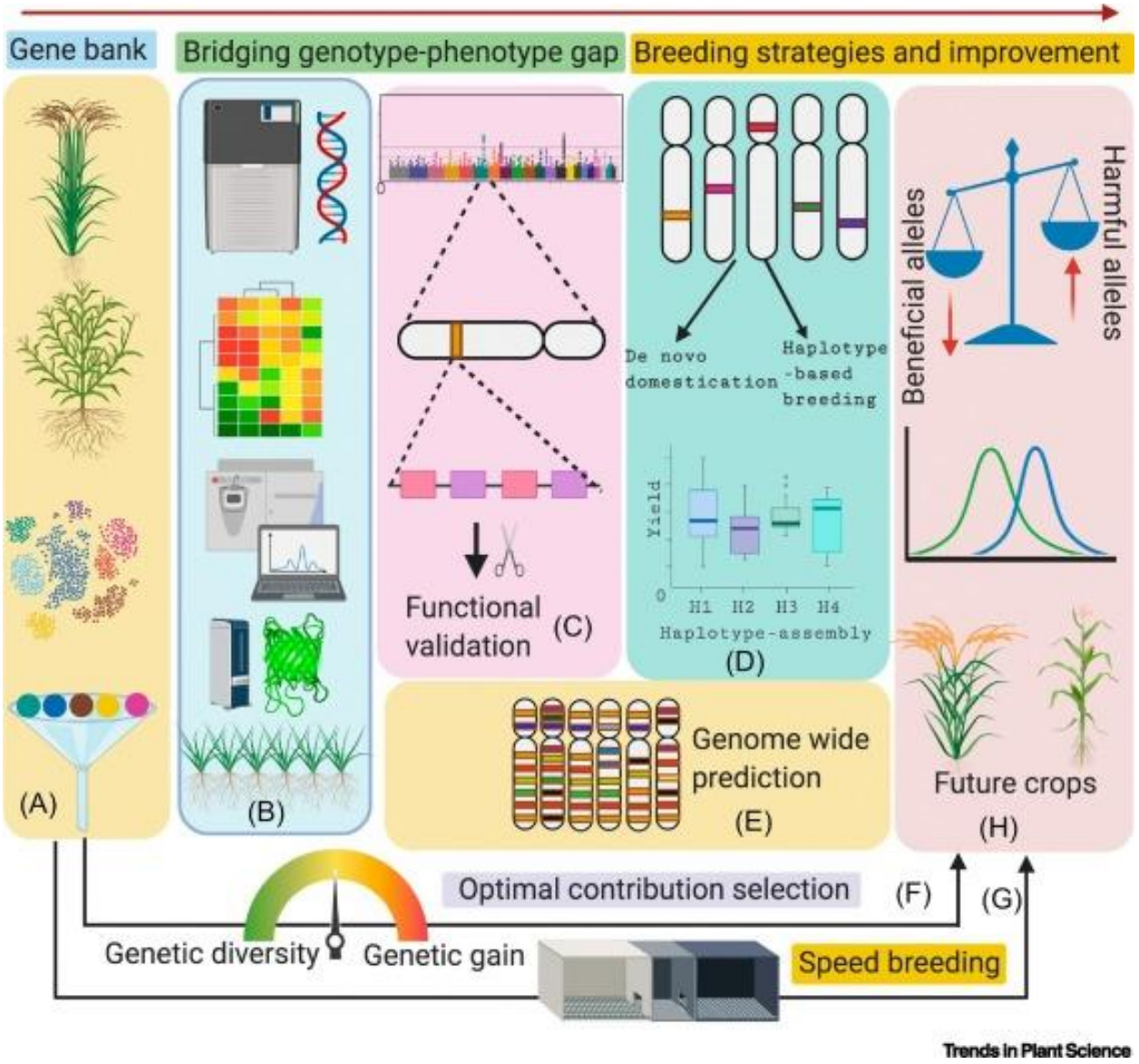

Varshney, R.K et al. (2021). Designing Future Crops: Genomics-Assisted Breeding Comes of Age. Trends in Plant Science 26, 631–649. .

Recursos genéticos

Pre breeding

Breeding

Variedades

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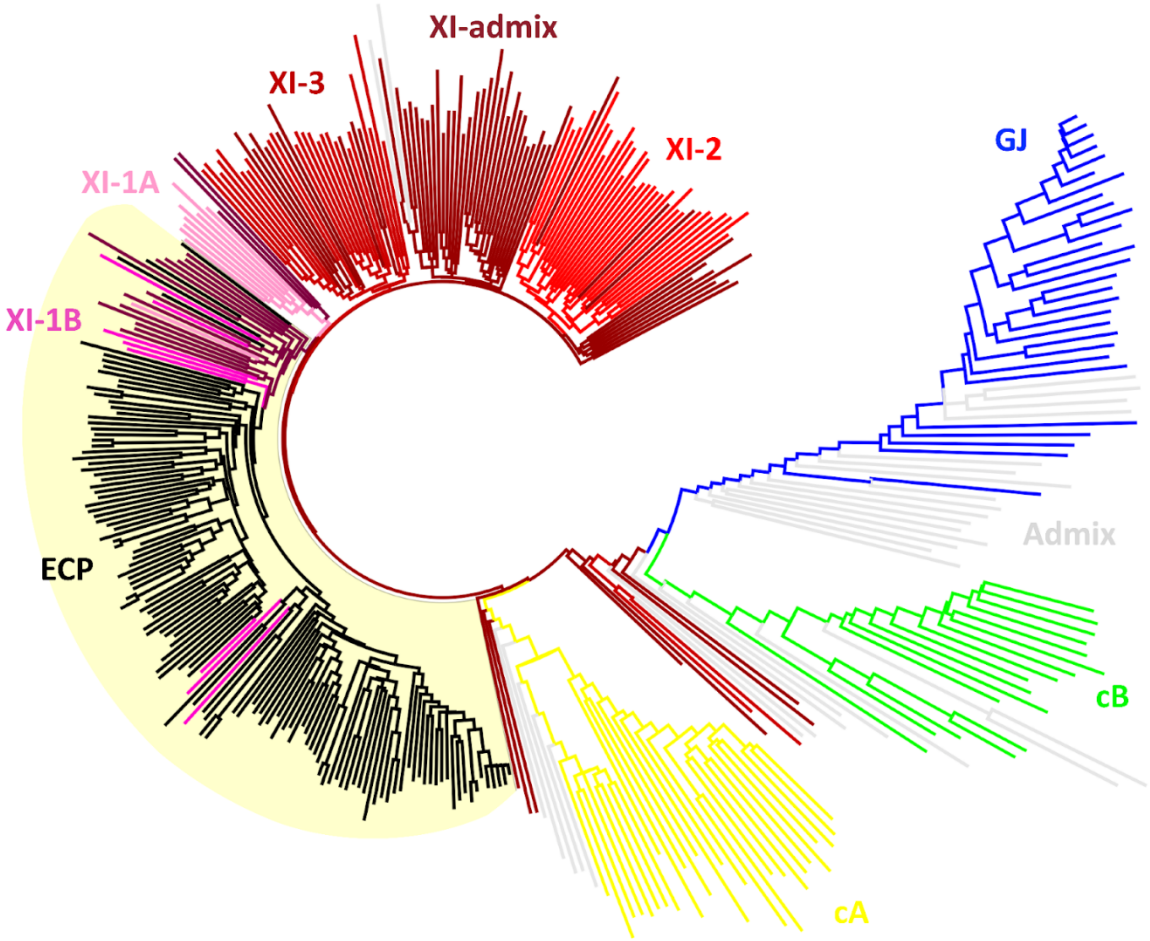
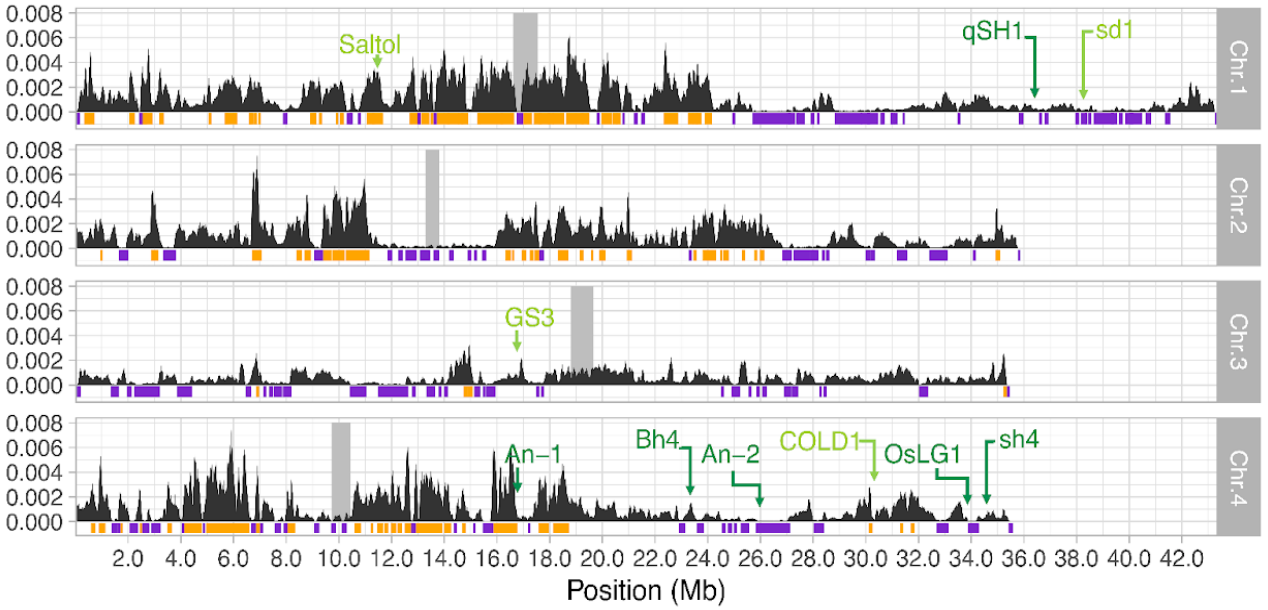
Ejemplo 1: caracterización de la diversidad genética de un programa





Nguyen *et al. (in prep).* Genome-wide characterization of diversity in an elite rice breeding program at IRRI

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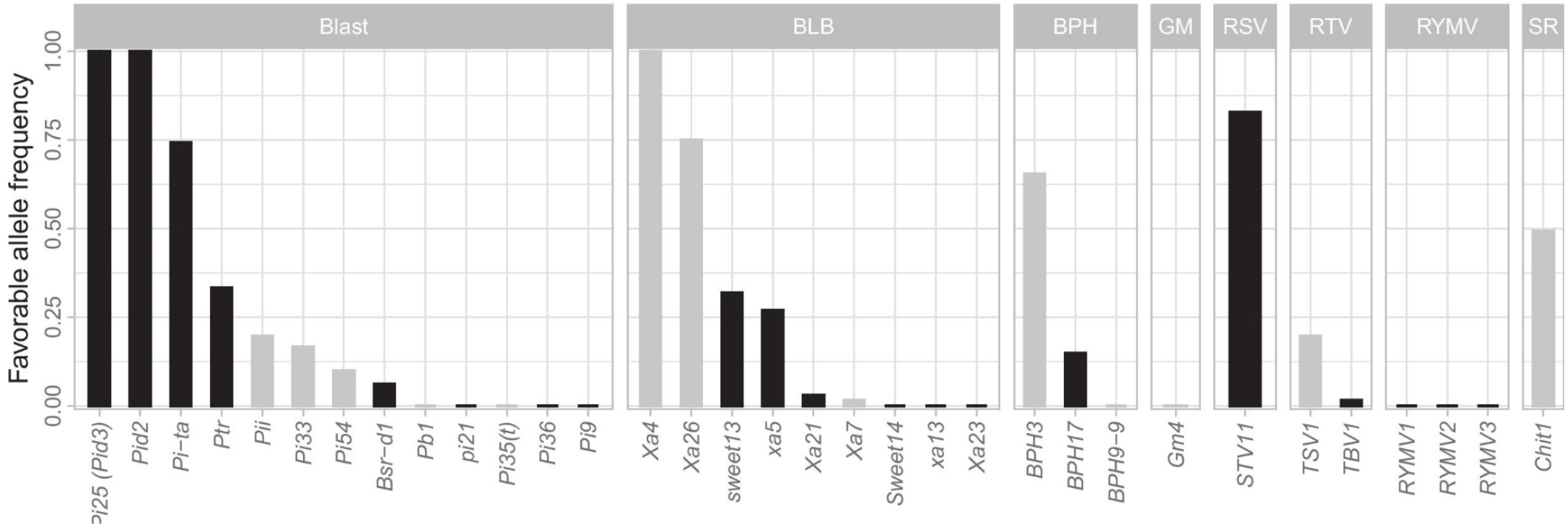
Ejemplo 1: caracterización de la diversidad genética de un programa



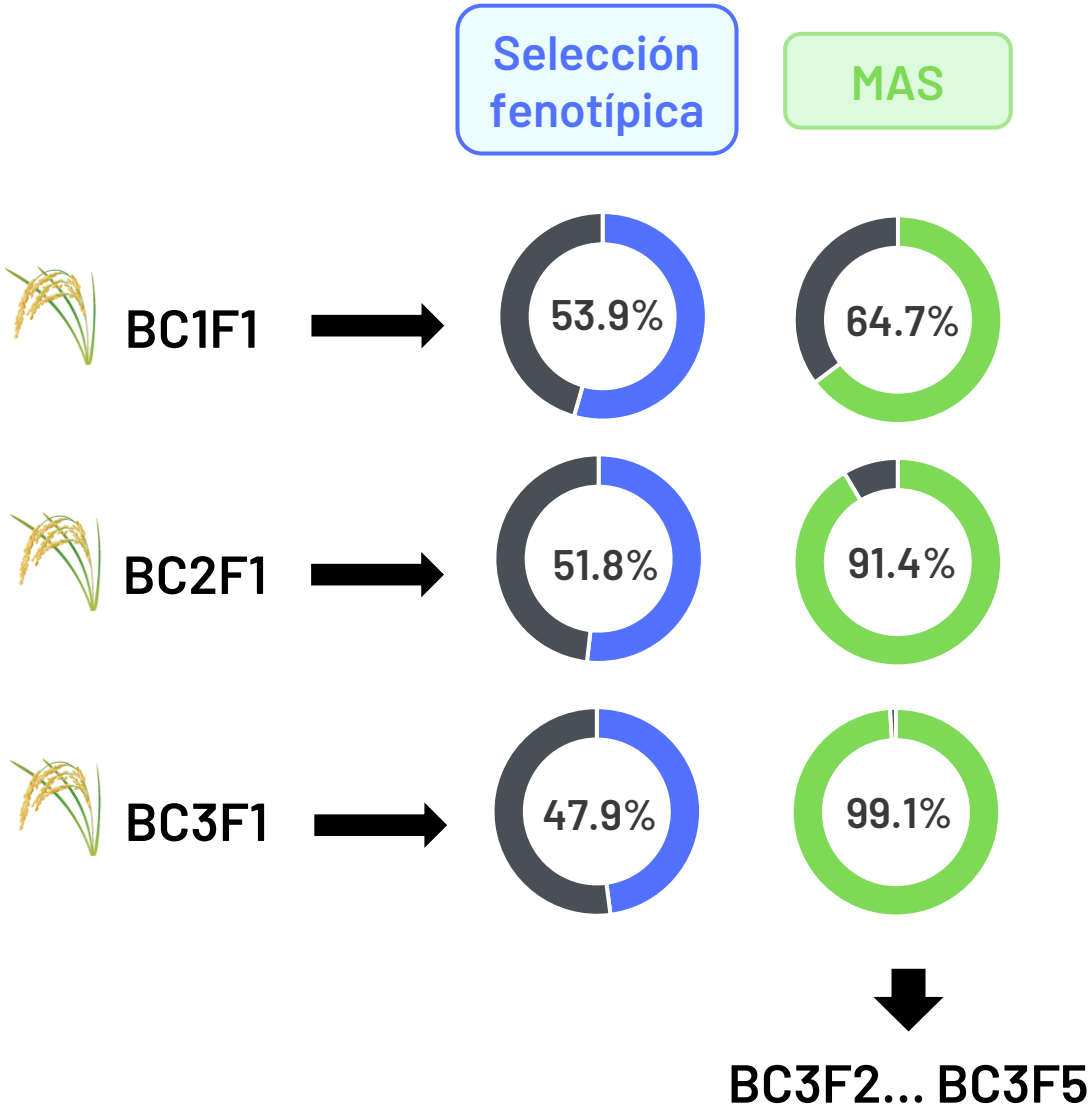
Juma, R.U. *et al.* (2021).Identification of an Elite Core Panel as a Key Breeding Resource to Accelerate the Rate of Genetic Improvement for Irrigated Rice. Rice **14**, 92

Ejemplo 2: selección asistida por marcadores

- Perfil QTL de los progenitores

	Trait categ	Abiotic str	Abiotic str	Abiotic str	Abiotic str	Abiotic str	Abiotic str	Biotic stre	Biotic stre	Biotic stre	Biotic stre	Biotic stre	Biotic stre	Biotic stre	Biotic stre	Biotic stre	Biotic stre	Grain qua	Grain qua	Grain qua	Grain qua	Grain qua	Grain qua
	Trait	Anaerobic	Anaerobic	Drought-v	Salinity-ve	Submergence		Blast	Blast	Blast	Blast	Blast	Blast					Amylose	Aroma	Chalk	Chalk	Gelatinisa	Grain zinc
	Lines	**qAG1**	**qAG3**	**Dro1**	**Saltol**	**qSub1**	**OsHP**	**Pi9**	**Pik**	**Pii**	**Pi54**	**Pita**	**Ptr**	**pi21**	**Pi35**	**qPi33**	**Bsr-D1**	**Waxy**	**fgr-1**	**Chalk5**	**PGC8-2**	**Alk**	**NAS3**
indica	1	[-]	[+]	[+]	[+]-Aus	[-]	[-]	?	Pikm/Katy	[-]	[+]	[-]	[-]	?	[-]	?	?	Wx(a)	[-]	?	[-]	[+]-Alk-3b	[-]
indica	2	[-]	[+]	?	[+]-Aus	[-]	[-]	?	Pikm/Katy	[-]	[+]	[-]	[-]	?	[-]	[-]	[-]	Wx(a)	[-]	?	[-]	[+]-Alk-3b	[-]
indica	3	[-]	?	[+]	[-]	[-]	[-]	[-]	[-]: japoni	[-]	[-]	[+]	[-]	?	[-]	[-]	[-]	wx(b)	[-]	[+]	[-]	[+]-Alk-3b	[-]
indica	4	?	?	[+]	[-]	[-]	[-]	[-]	IR64 [-]	[-]	[-]	[+]	[+]-Ptr	?	[-]	?	?	Wx(a)	[-]	?	[-]	[-]	[-]
indica	5	[-]	[+]	[+]	[-]	[-]	[-]	[-]	Pikm/Katy	?	[+]	[-]	[-]	?	[-]	?	[-]	Wx(a)	[-]	?	[-]	[+]-Alk-3b	[-]
indica	6	[-]	[+]	[+]	[+]-Aus	[-]	[-]	[-]	IR8 [-]	[-]	[+]	[-]	[-]	?	[-]	?	[-]	Wx(a)	[-]	?	[-]	[+]-Alk-3b	[+]
indica	7	?	[+]	[+]	[Het]	[-]	[-]	?	IR64 [-]	[-]	[-]	[-]	[-]	?	[-]	?	?	Wx(a)	[-]	?	[-]	[+]-Alk-3b	[+]
indica	8	[-]	[+]	[+]	[+]-Aro	[-]	[-]	?	[-]: japoni	[-]	[-]	[+]	[-]	?	[-]	?	?	Wx(a)-NB	[-]	[-]	[-]	[+]-Alk-3b	[+]
indica	9	?	[+]	[+]	[+]-Aro	[-]	[-]	?	IR8 [-]	[-]	[+]	[+]	[+]-Ptr	?	[-]	[-]	?	Wx(a)	[-]	[-]	[-]	[+]-Alk-3b	[+]
indica	10	[-]	[+]	[+]	[+]-Aus	[-]	[-]	?	[-]: japoni	[-]	[-]	[+]	[+]-Ptr	?	[-]	[-]	?	Wx(a)	[-]	[-]	[-]	[+]-Alk-3b	[-]
indica	11	[-]	?	[+]	[-]	[-]	[-]	?	?	[-]	?	[Het]	[-]	?	[-]	?	?	Wx(a)	[-]	[+]	[-]	[+]-Alk-3b	[-]
indica	12	[-]	?	[+]	[-]	[-]	[-]	[-]	[-]: japoni	[-]	[-]	[+]	[-]	?	[-]	[-]	?	wx(b)	[-]	?	[-]	[+]-Alk-3b	[-]
indica	13	[-]	[+]	[+]	[-]	[-]	[-]	?	IR64 [-]	[-]	[-]	[-]	[-]	?	[-]	[-]	[-]	wx(b)	[-]	?	[-]	[+]-Alk-3b	[-]
indica	14	?	?	[+]	[-]	[-]	[-]	[-]	?	[-]	[+]	[+]	[+]-Ptr	?	[-]	?	?	Wx(a)-NB	[-]	?	[-]	[+]-Alk-3b	[-]
indica	15	[-]	?	[+]	[-]	[-]	[-]	?	[-]: japoni	[-]	?	[-]	[-]	?	[-]	?	[-]	Wx(a)	[-]	[-]	[-]	[+]-Alk-3b	[-]
japonica	16	?	[+]	[+]	?	[-]	[-]	?	IR64 [-]	[-]	[-]	[-]	[-]	?	[-]	?	?	Wx(a)	[-]	?	[-]	[+]-Alk-3b	[+]
japonica	17	[-]	[+]	[+]	?	[-]	[-]	[-]	[-]: japoni	[+]	[-]	[-]	[-]	[-]	?	[-]	?	Wx(int)-Ba	[-]	?	[+]	[-]	[+]
japonica	18	?	[+]	[+]	[-]	[-]	[-]	[-]	[-]: japoni	[-]	[-]	[-]	[-]	?	[-]	[-]	?	Wx(int)-Ba	[-]	[-]	[+]	[-]	[+]
japonica	19	?	[+]	[+]	[-]	[-]	[-]	[-]	[-]: japoni	[-]	[-]	[-]	[-]	?	[-]	[-]	?	Wx(int)-Ba	[-]	[-]	[+]	[-]	[+]
japonica	20	?	[+]	[+]	[-]	[-]	[-]	[-]	[-]: japoni	[-]	[-]	[-]	[-]	?	[-]	[-]	?	Wx(int)-Ba	[-]	?	[+]	[-]	[+]
japonica	21	?	[+]	[+]	[-]	[-]	[-]	[-]	[-]: japoni	[-]	[-]	[-]	[-]	?	[-]	?	?	Wx(int)-Ba	[-]	[+]	[+]	[-]	[+]
japonica	22	?	[+]	[+]	[-]	[-]	[-]	[-]	[-]: japoni	[-]	[-]	[-]	[-]	?	[-]	[-]	?	Wx(int)-Ba	[-]	?	[+]	[-]	[+]
japonica	23	?	[+]	[+]	[-]	[-]	[-]	?	[-]: japoni	[-]	[-]	[-]	[-]	?	[-]	[-]	[-]	Wx(int)-Ba	[-]	?	[+]	[-]	[+]
japonica	24	?	[+]	[+]	[-]	[-]	[-]	?	[-]: japoni	[-]	[+]	[-]	[-]	?	[-]	[-]	?	Wx(int)-Ba	[-]	[-]	[+]	[-]	[+]
japonica	25	?	[+]	[+]	[-]	[-]	[-]	[-]	[-]: japoni	[-]	[+]	[-]	[-]	?	[-]	[-]	[-]	Wx(int)-Ba	[-]	[-]	[+]	[-]	[+]
japonica	26	?	[+]	[+]	[-]	[-]	[-]	[-]	[-]: japoni	[-]	[-]	[-]	[-]	?	[-]	[-]	?	wx(b)	[-]	[-]	[+]	[-]	[+]
japonica	27	?	[+]	[+]	[-]	[-]	[-]	?	[-]: japoni	[-]	[-]	[-]	[-]	?	[-]	[-]	?	Wx(int)-Ba	[-]	?	[+]	[-]	[+]
japonica	28	?	[+]	[+]	[-]	[-]	[-]	?	[-]: japoni	?	[-]	[-]	[-]	?	[-]	[-]	?	Wx(int)-Ba	[-]	?	[+]	[-]	[+]
japonica	29	?	[+]	[+]	[-]	[-]	[-]	?	[-]: japoni	[-]	[-]	[-]	[-]	?	[-]	[-]	?	Wx(int)-Ba	[-]	[-]	[+]	[-]	[+]
japonica	30	?	[+]	[+]	[-]	[-]	[-]	[-]	[-]: japoni	[-]	[-]	[-]	[-]	[-]	[-]	?	[-]	Wx(int)-Ba	[-]	[-]	[+]	[-]	[+]
japonica	31	?	[+]	[+]	[-]	[-]	[-]	?	[-]: japoni	[-]	[+]	[-]	[-]	[-]	[-]	[-]	[-]	Wx(int)-Ba	[-]	?	[+]	[-]	[+]
japonica	32	?	[+]	[+]	[-]	[-]	[-]	[-]	[-]: japoni	[-]	[+]	[-]	[-]	?	[-]	?	[-]	Wx(int)-Ba	[-]	?	[+]	[-]	[+]
japonica	33	?	[+]	[+]	[-]	[-]	[-]	?	[-]: japoni	[-]	[-]	[-]	[-]	?	[-]	[-]	[-]	Wx(int)-Ba	[-]	[-]	[+]	[-]	[+]
japonica	34	?	[+]	[+]	[-]	[-]	[-]	[-]	[-]: japoni	[-]	[+]	[-]	[-]	[-]	[-]	?	?	Wx(int)-Ba	[-]	[-]	[+]	[-]	[+]

Ejemplo 2: selección asistida por marcadores



- Introgresión de genes + recuperación del fondo genético

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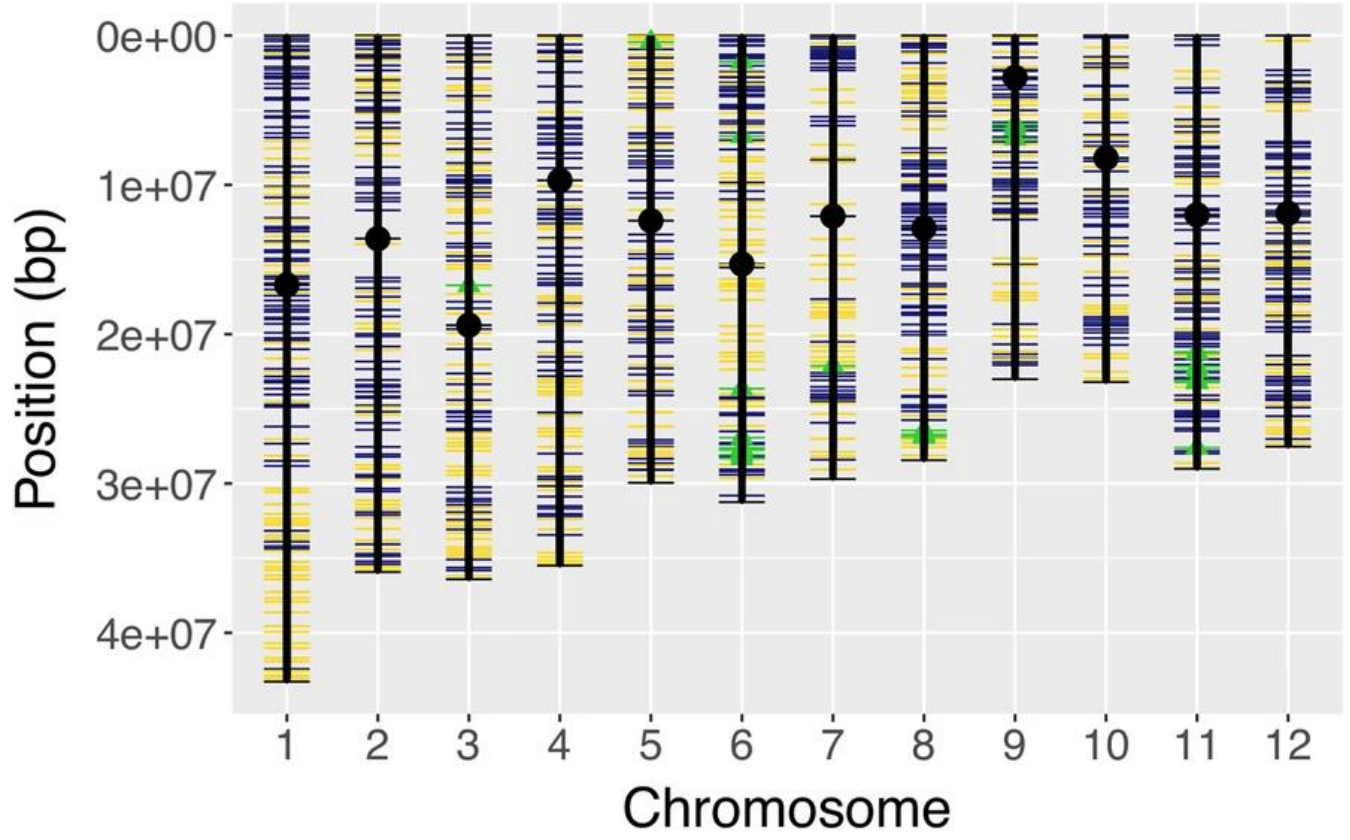
Ejemplo 3: selección genómica

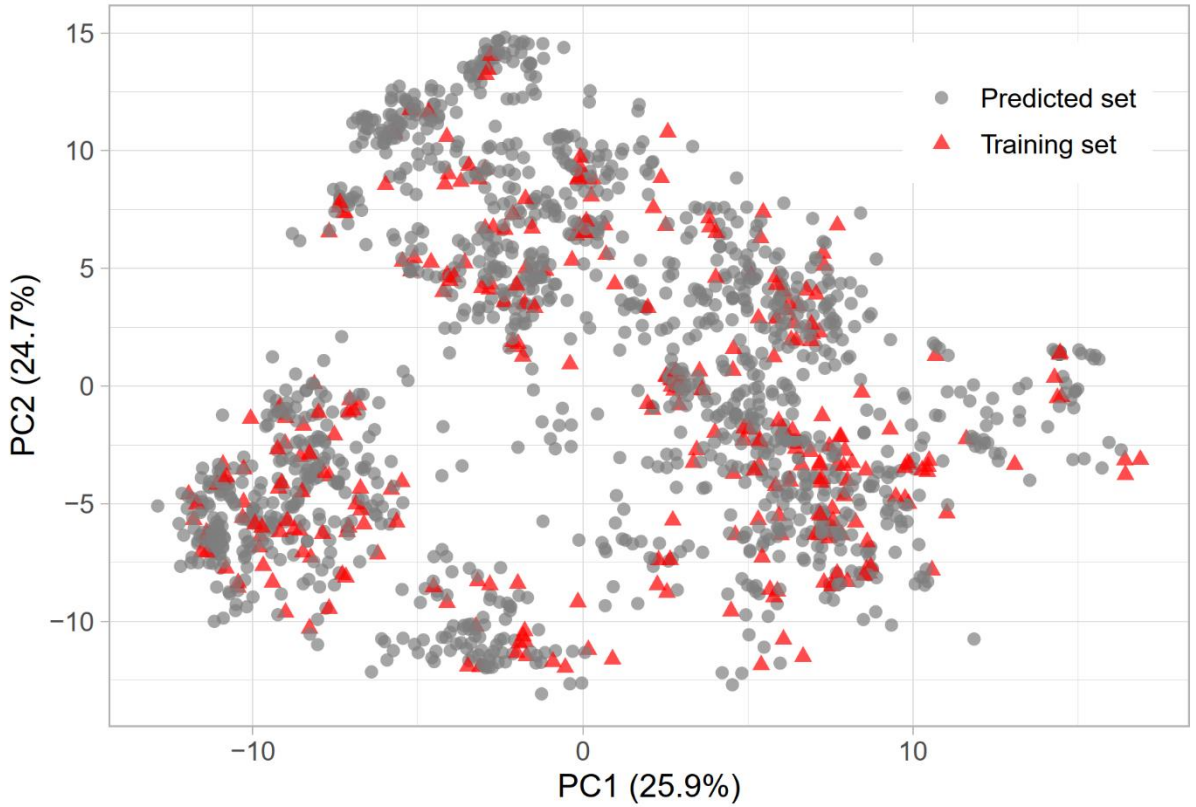
- Plataforma de genotipado eficiente

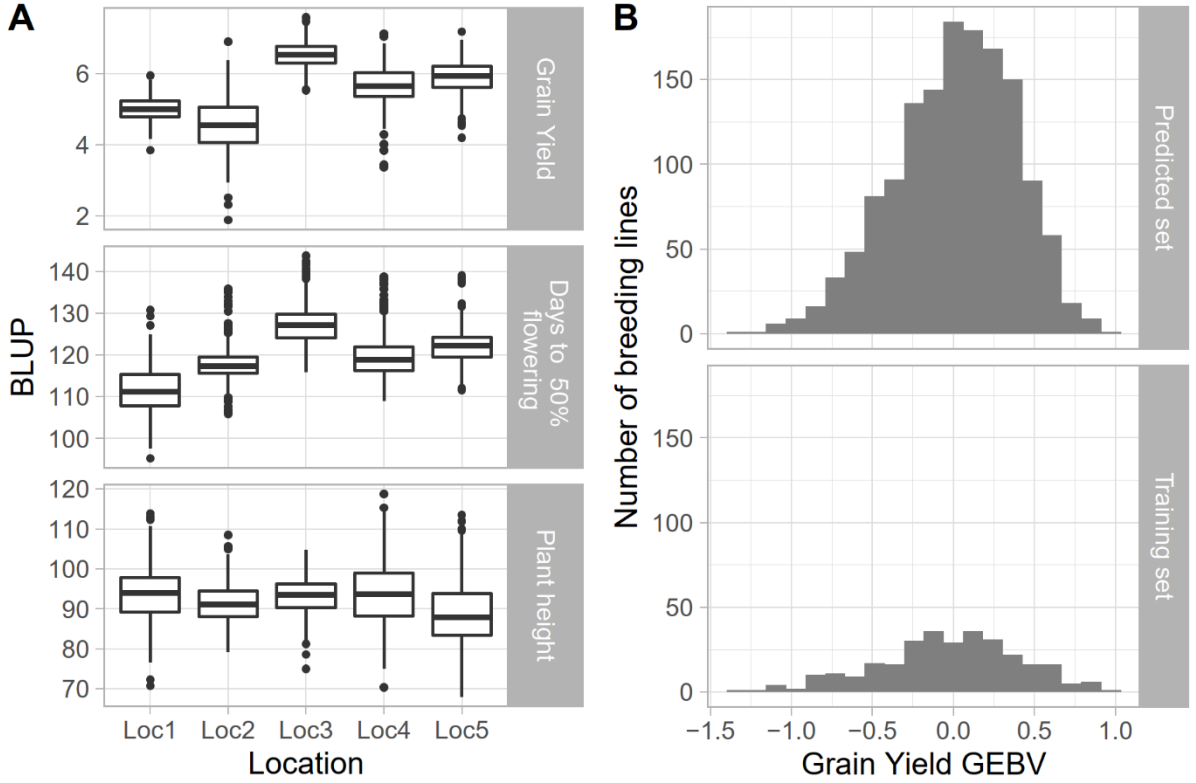


Arbelaez *et al.* (2019).1k-RiCA (*1K-Rice Custom Amplicon*) a novel genotyping amplicon-based SNP assay for genetics and breeding applications in rice. Rice **12**, 55

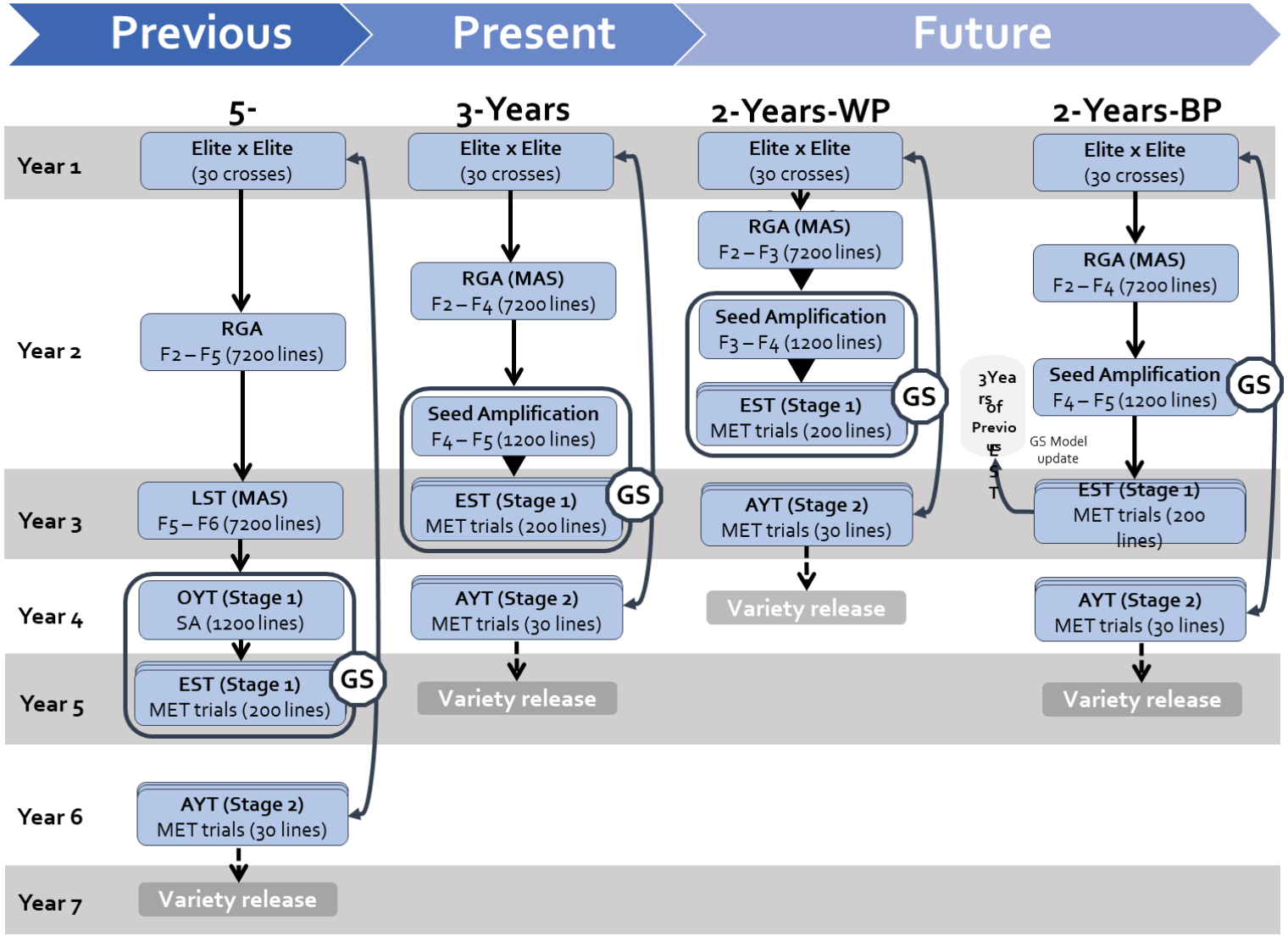
Ejemplo 3: selección genómica

- Optimización del training set y predicción





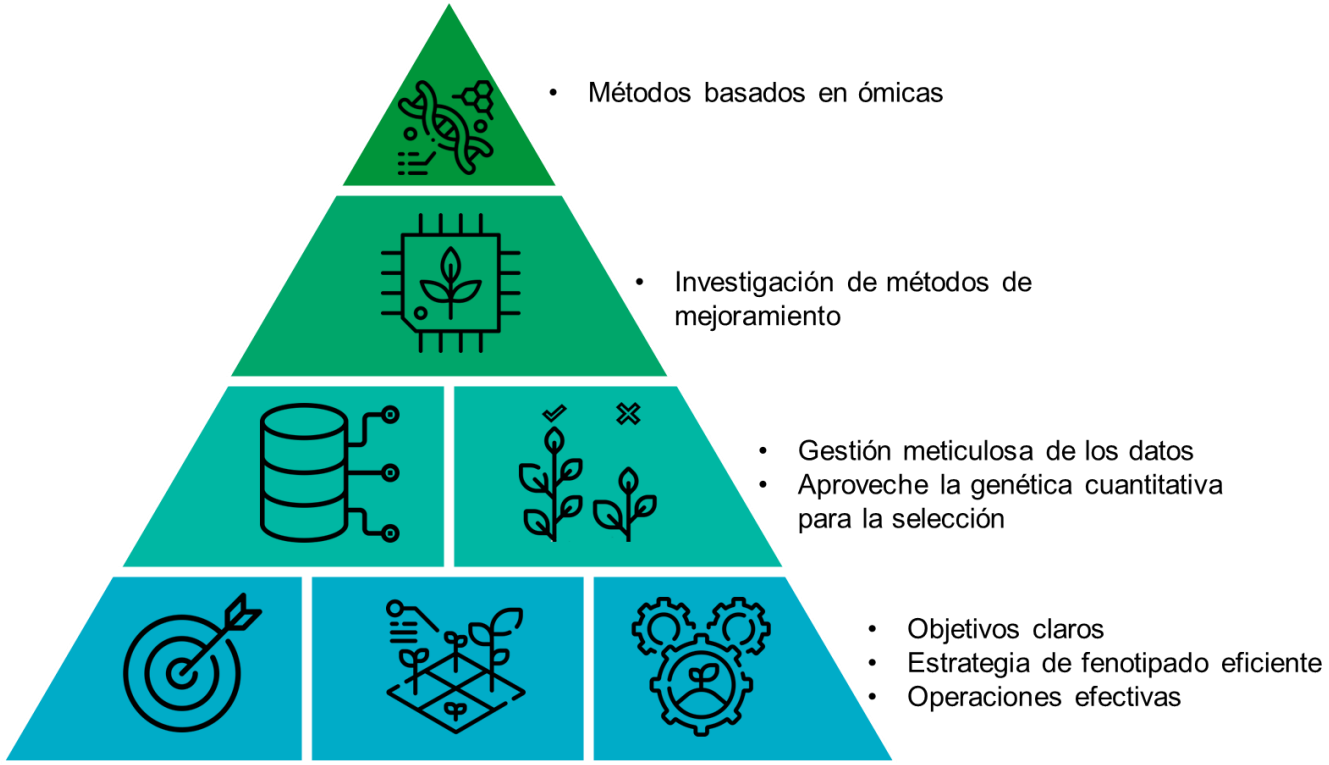
Ejemplo 3: selección genómica



Conclusion

- Las herramientas genómicas son útiles en todas las fases del proceso de mejora

- La base del programa debe ser sólida



Rutkoski, J. E. (2019). "A practical guide to genetic gain." Advances in Agronomy 157: 217-249.
Seck et al.. (2023). “Realized Genetic Gain in Rice: Achievements from Breeding Programs. Rice 16, 61

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Gracias

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