

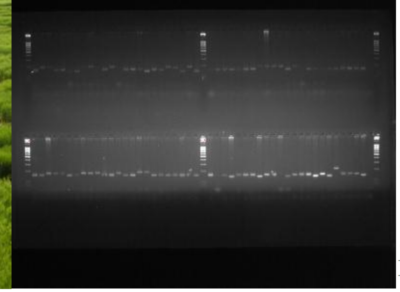
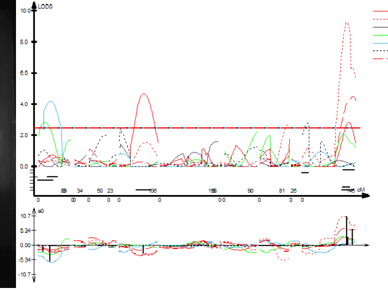


Determinantes genéticas del ciclo de cebada y los desafíos impuestos por la intensificación agrícola

Ariel Castro, Esteban Hoffman, Luis Viega

Facultad de Agronomía, Universidad de la República

Taller "Sistemas de Producción de Trigo y Cebada: Decisiones de manejo en base a conceptos ecofisiológicos para optimizar el rendimiento, la calidad y el uso de los recursos", CYTED Red Metrice, Universidad Austral de Chile, Valdivia, 14 y 15 de Noviembre de 2011.

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Facultad de Agronomía. Paysandú.
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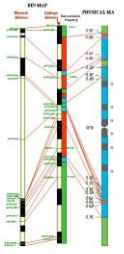
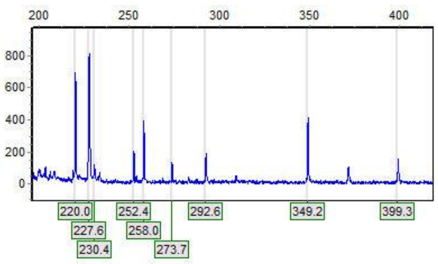
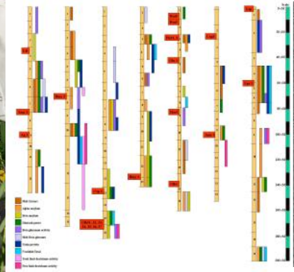
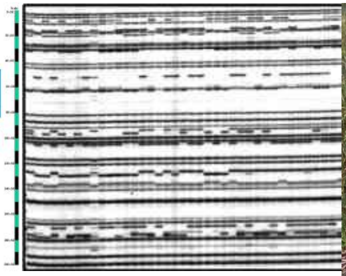
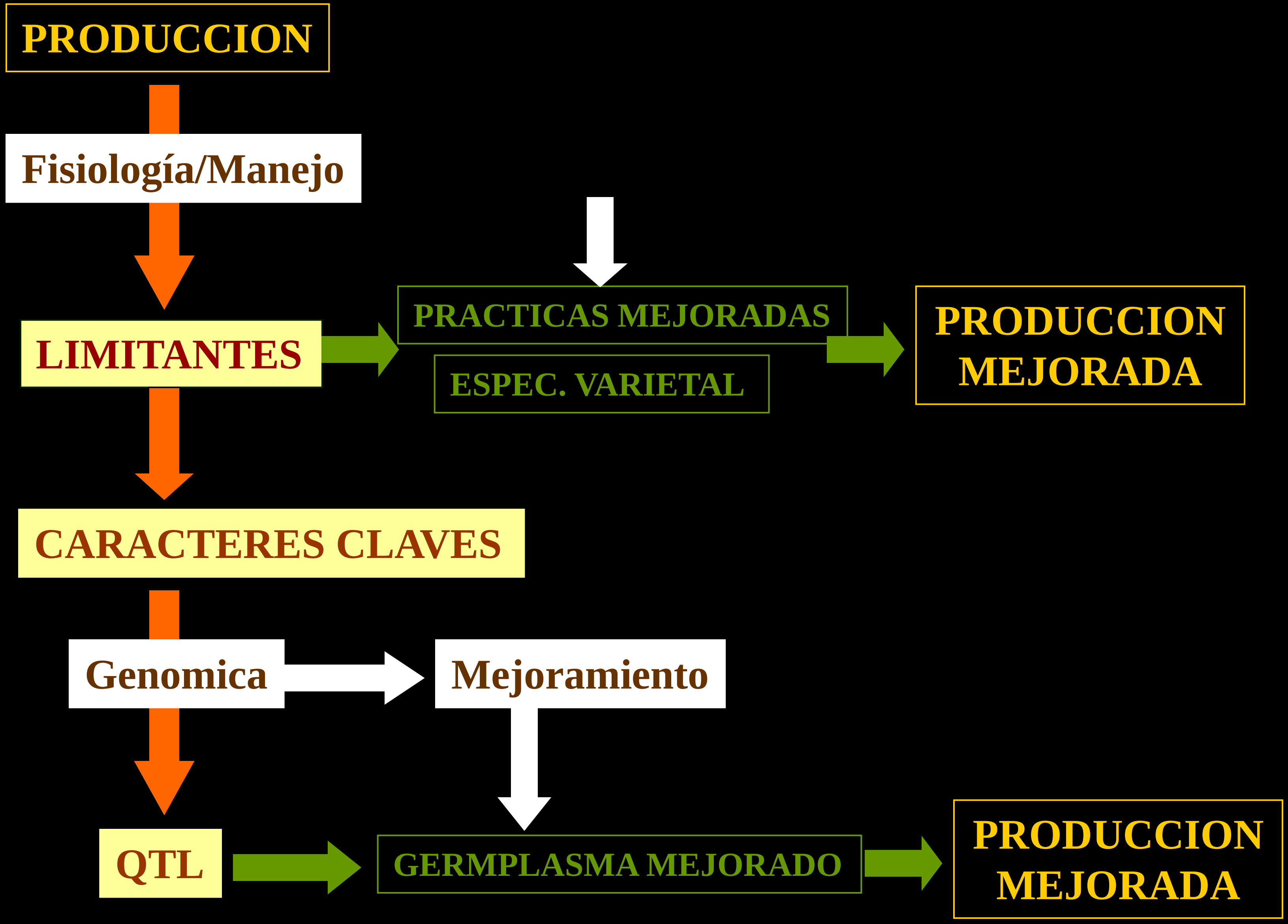




- **EL CULTIVO EN EL SISTEMA AGRICOLA ACTUAL**
- **GERMOPLASMA DISPONIBLE**
- **BASES GENETICAS**
- **PERSPECTIVAS**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Fisiología/Manejo
LIMITANTES
PRACTICAS MEJORADAS
ESPEC. VARIETAL
PRODUCCION MEJORADA
CARACTERES CLAVES
Genomica
Mejoramiento
QTL
GERMPLASMA MEJORADO
PRODUCCION MEJORADA


EEMAC
EELE
Paysandu, Uruguay
Entre Rios
Uruguay
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La Plata
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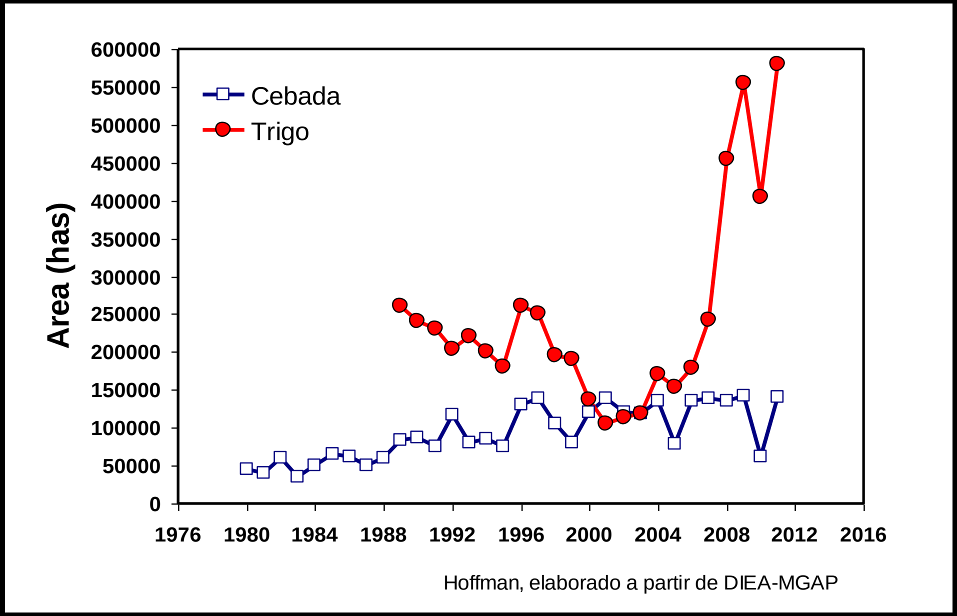
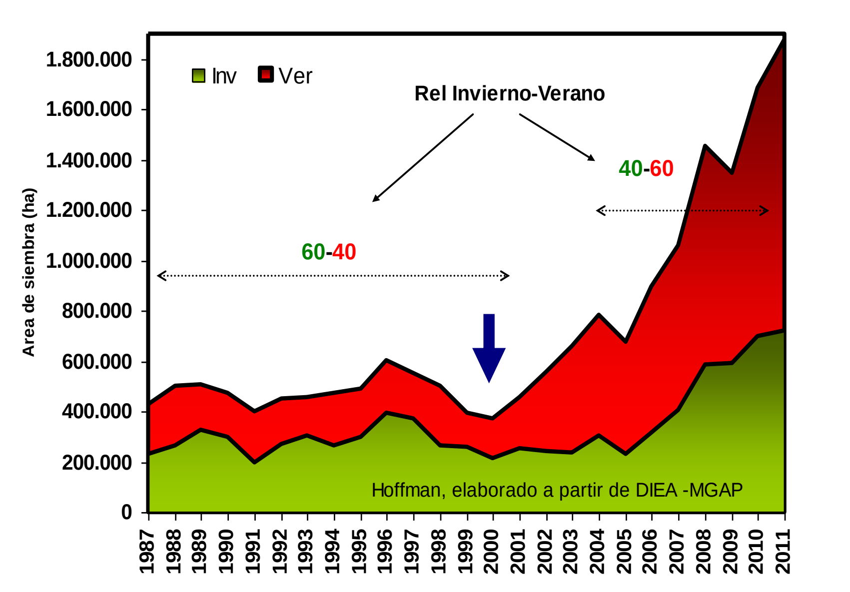
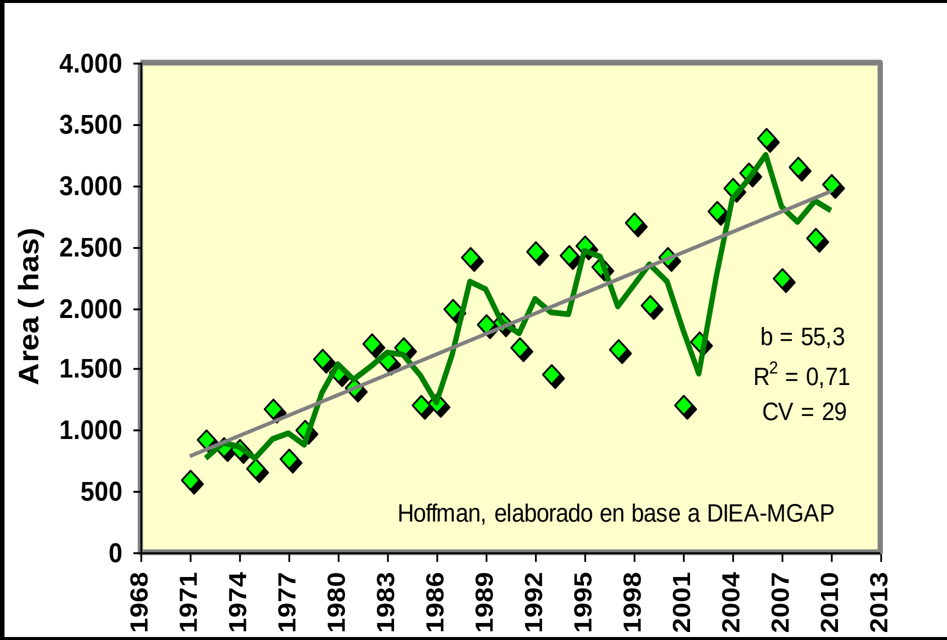
US Dept of State Geographer
Google
Pointer 32°37'26.48" S 56°00'54.05" W elev 549 ft Streaming 100%
Eye alt 343.87 mi

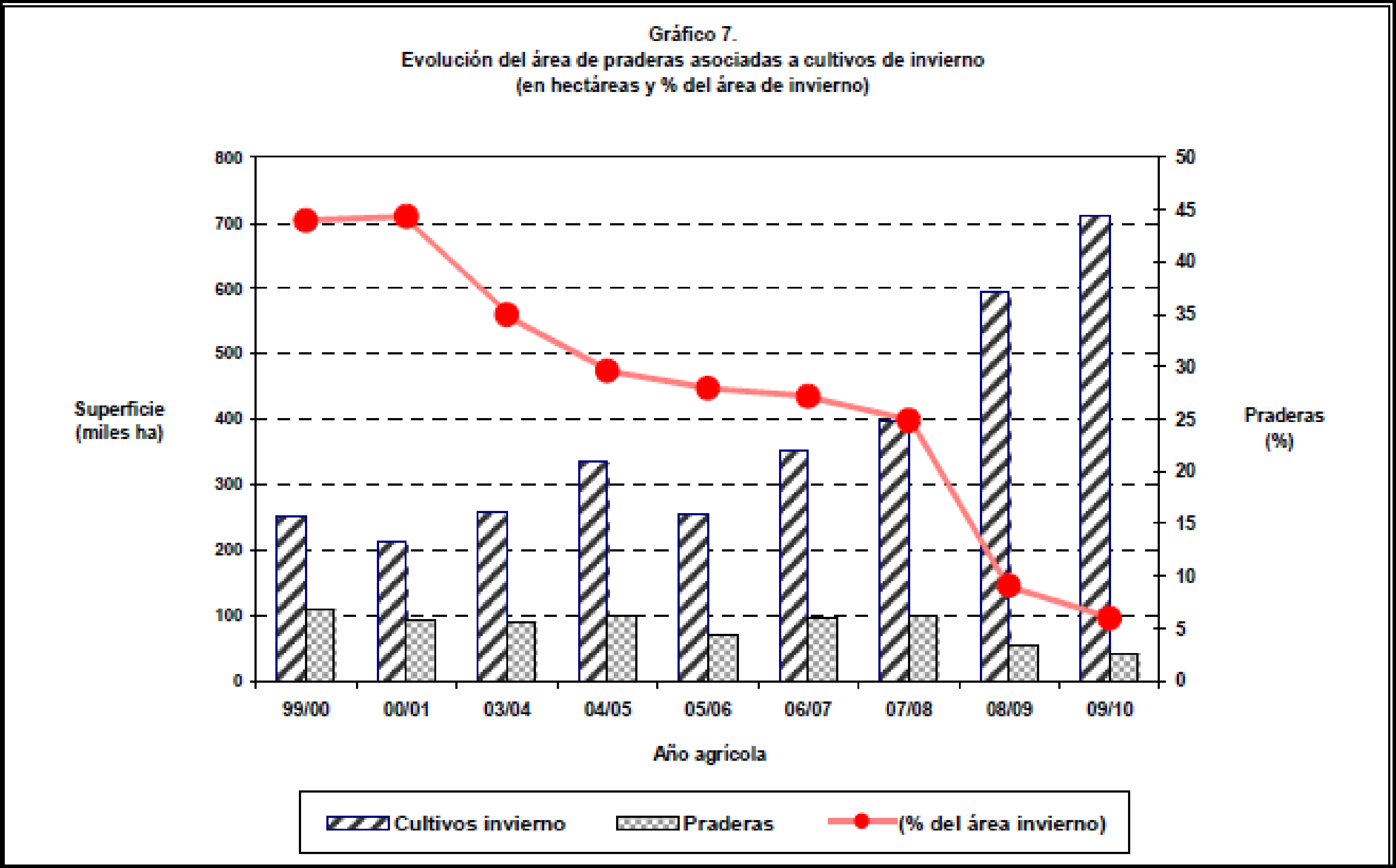
Principales cambios en cereales de invierno en Uruguay en los últimos años.







Evolución e importancia de la siembras de pasturas asociada a los cultivos de invierno en Uruguay. F: DIEA – MGAP 2010



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LLENADO DE GRANO
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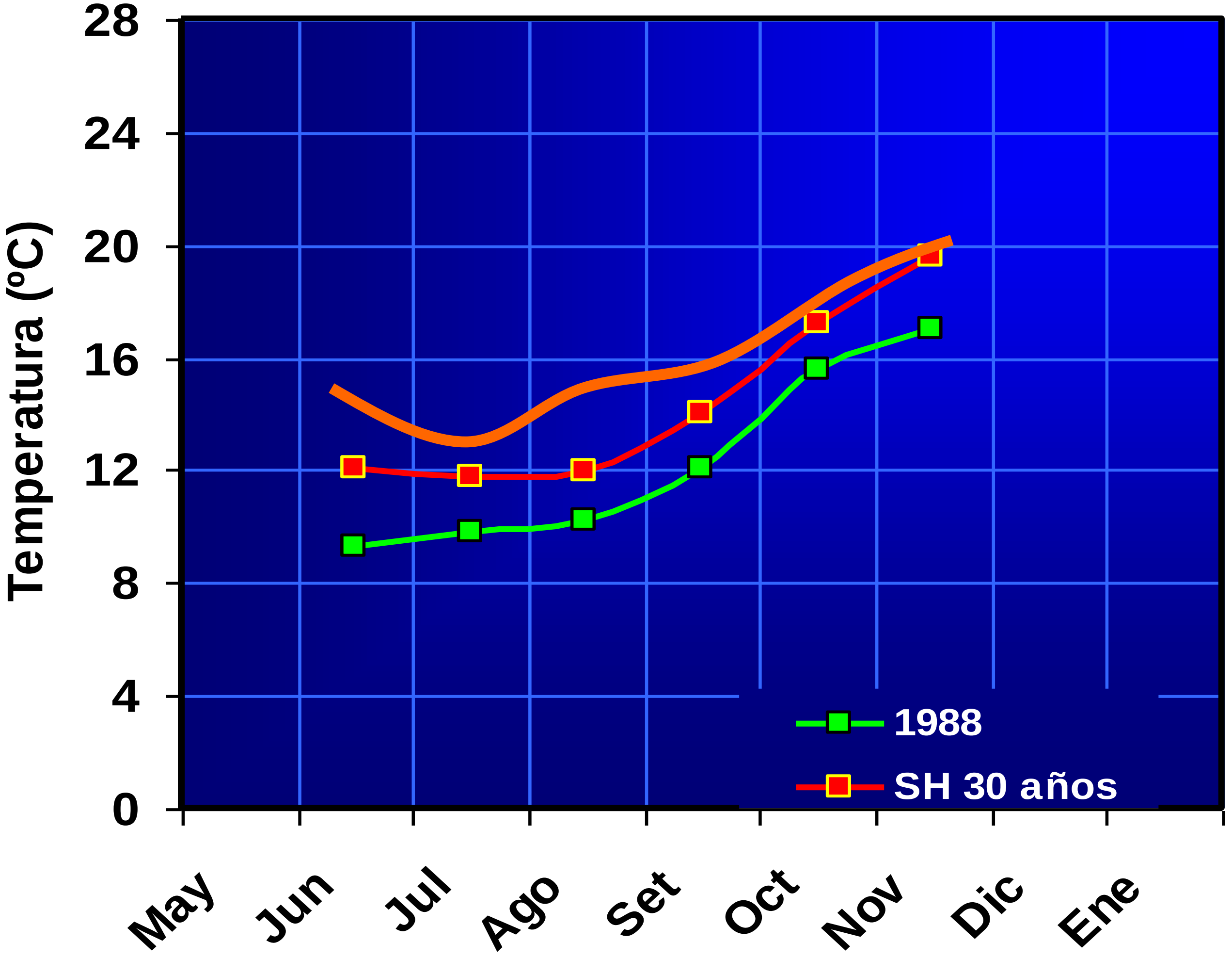
Evolución de la temperatura durante la estación de crecimiento de cultivos de invierno de 1988 en relación a la serie histórica para la zona norte.



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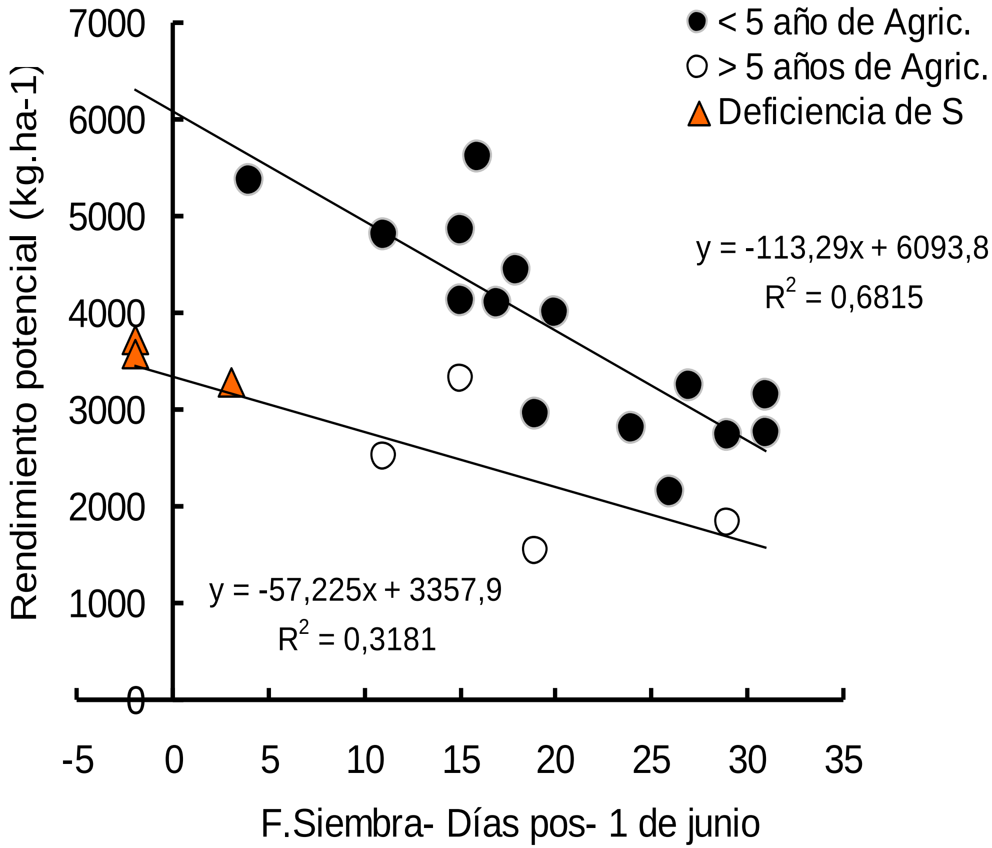
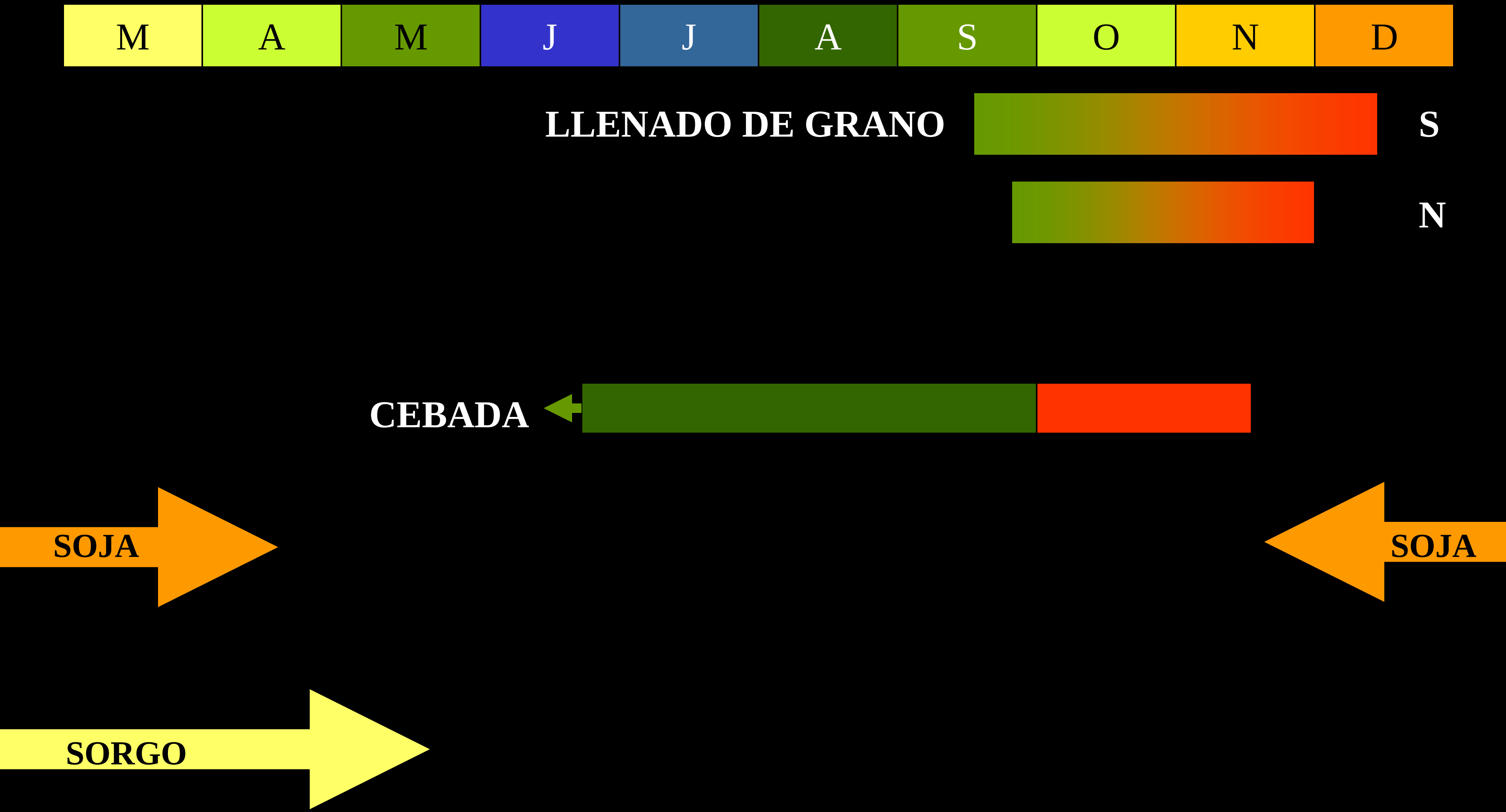
Factores de producción y manejo asociados con la variación del potencial máximo por sitio (2009)



Fuente: Hoffman y Baeten sp



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Cultivares de cebada sembrados a nivel nacional en año 2005-06 y 2011-12.

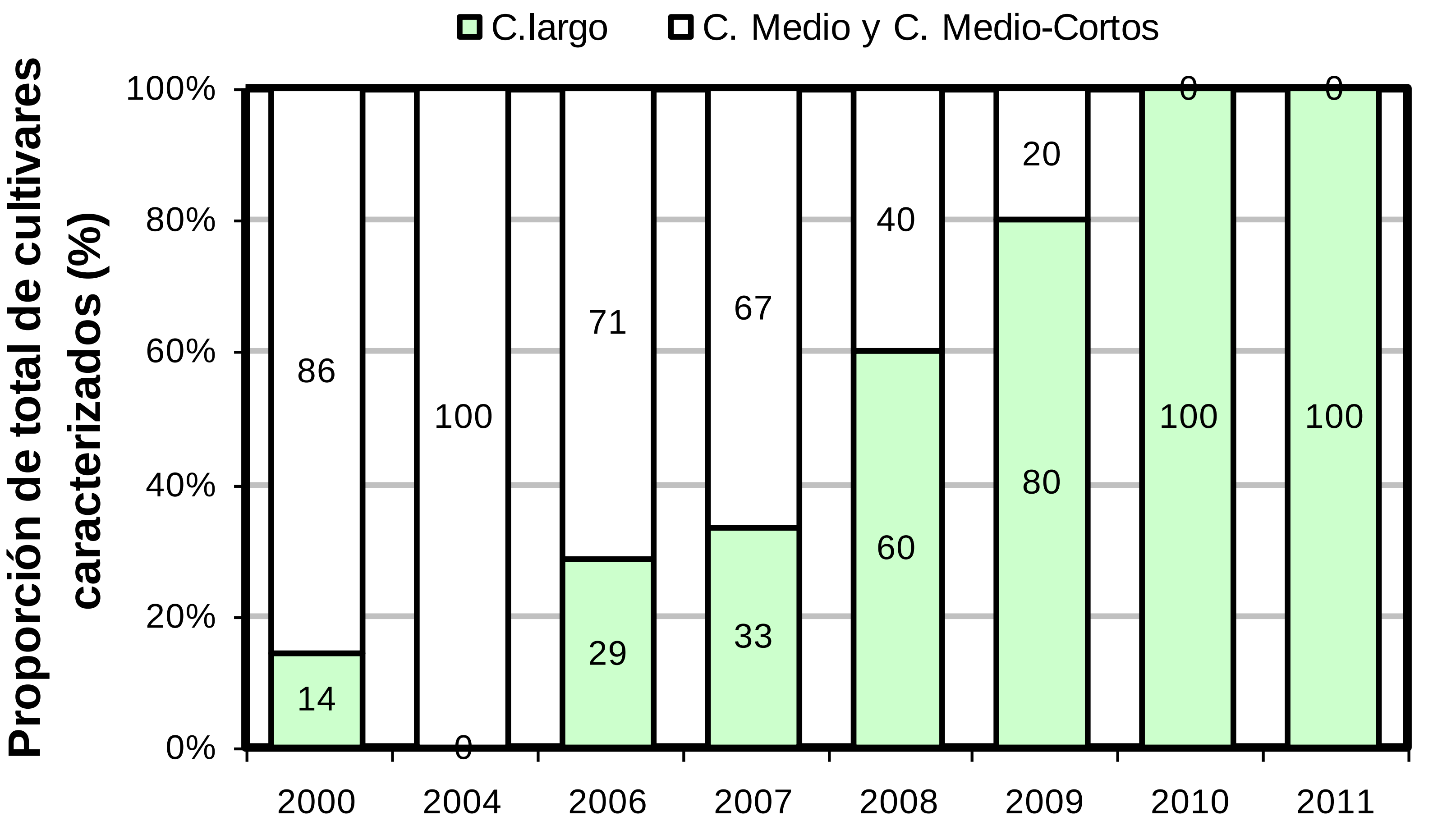
2005-06

INIA Ceibo	CL
INIA Arrayán	CL
Danuta	CL
Daymán	CM
Q. Ayelen	CM
Ambev 488	CM
Q. Ainara	CM
MUSA 936	CM
Carumbé	CMc

2011-12

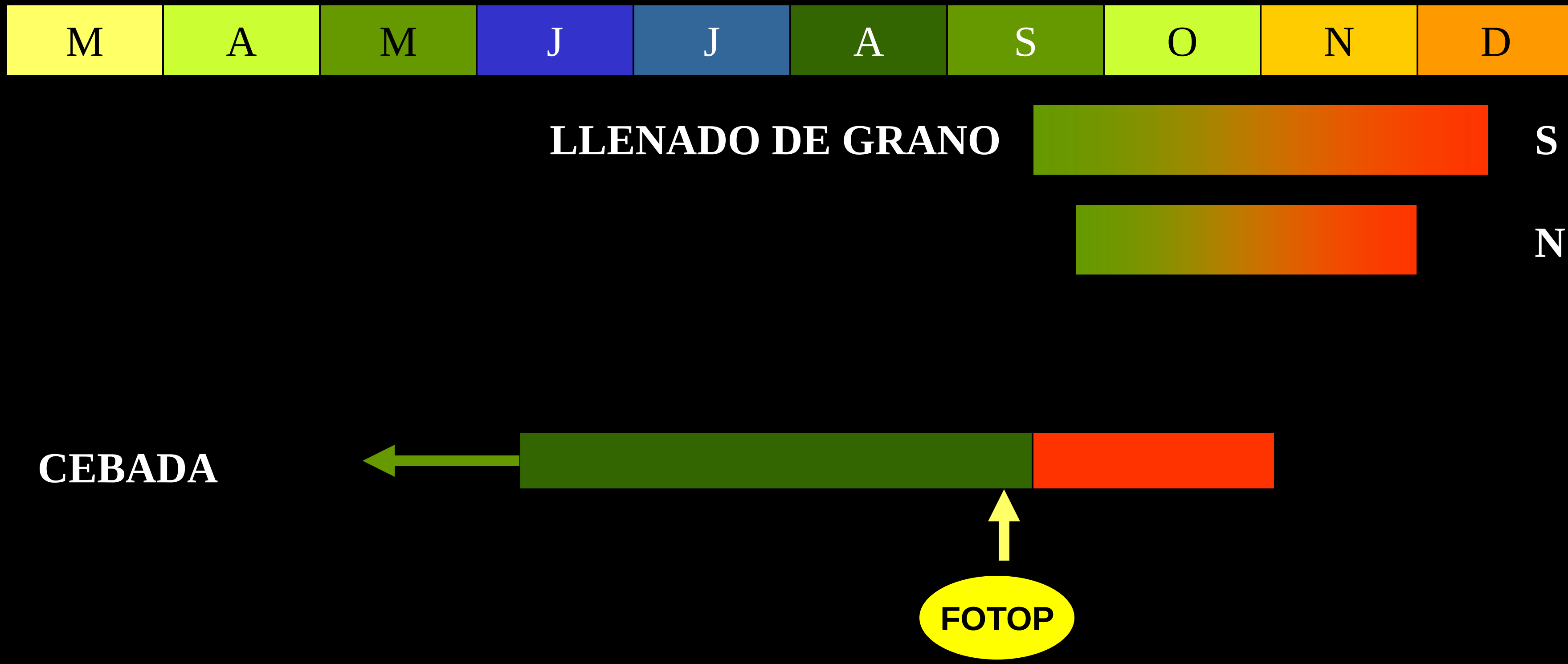
INIA Ceibo	CL
INIA Arrayán	CL
Conchita	CL
MADI	CL
LAISA	CL
Daymán	CM

Evolución de la proporción de cultivares de cebada de ciclo largo y ciclo medio - medio corto enviados al programa de caracterización de cultivares de la Facultad de Agronomía



Fecha ultima helada

Adaptado: Caorsi, 1982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LLENADO DE GRANO
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CEBADA
FOTOP

	Grupo1 (Clipper)	Grupo 2 Quebracho
Rendimiento	4878	**5438**
Biomasa Total (Kg/ha)	11555	12524
Índice de Cosecha	**0.374**	**0.412**
Espigas/m^{-2}	**615**	**638**
Granos/espiga	16.6	**17.9**
Peso de mil granos (g)	47.2	**48.6**
Ciclo a espigazón	74.6	**73.2**
1a.+2a.	91.0	**96.0**

Castro et al., 1997

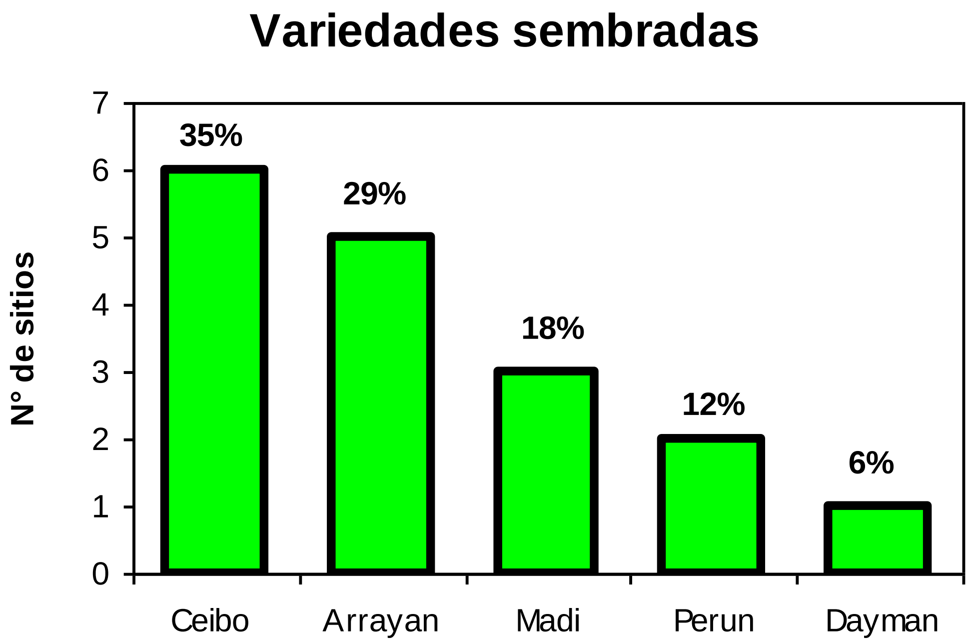
	Grupo1 (Clipper)	Grupo 2 Quebracho	Grupo 3	Grupo 4	Grupo 5
Rendimiento	4878	**5438**	**5749**	**5743**	**5937**
Biomasa Total (Kg/ha)	11555	12524	11562	12038	**13801**
Índice de Cosecha	**0.374**	**0.412**	**0.440**	0.424	0.385
Espigas/m^{-2}	**615**	**638**	523	**648**	**640**
Granos/espiga	16.6	**17.9**	**19.1**	21.1	22.0
Peso de mil granos (g)	47.2	**48.6**	48.6	47.8	47.7
Ciclo a espigazón	74.6	**73.2**	80.4	84.4	78.1
1a.+2a.	91.0	**96.0**	91.3	91.1	90.9

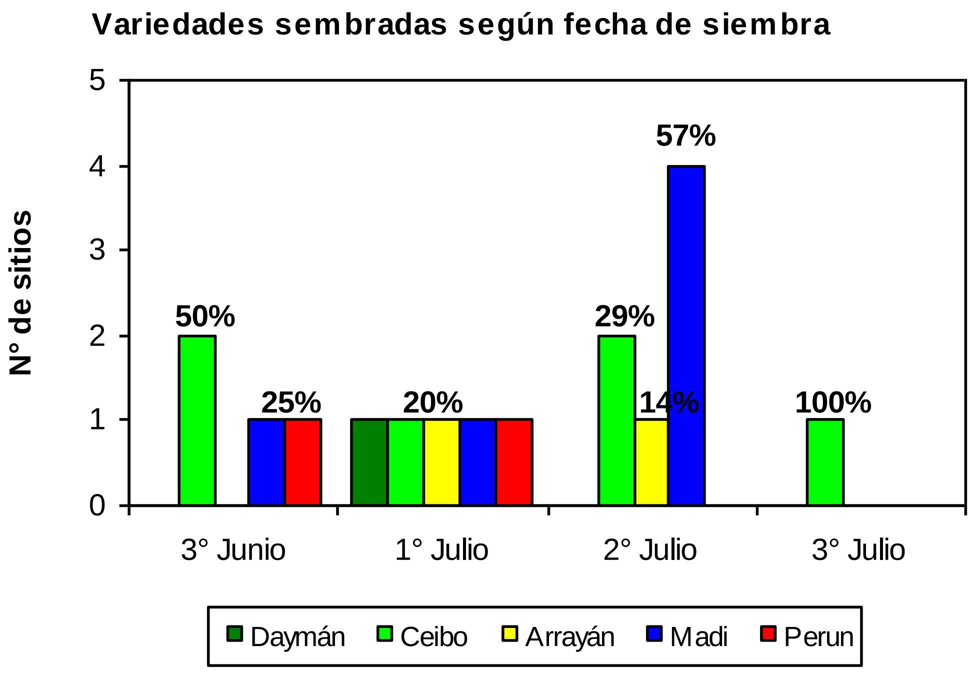
Castro et al., 1997

	Emergencia -Espigazón		Espigazón-Madurez	
	1992	1993	1992	1993
Tº media	13.5	13.5	18.1	**19.7**
Precipitación	177	63	96	**268**
Nº heladas	21	19	1	0
Duración	80	78	34	34

	Grupo1 (Clipper)	Grupo 2 Quebracho	Grupo 3	Grupo 4	Grupo 5
Rendimiento	3587	**3661**	**3676**	**3846**	**3556**
Biomasa Total (Kg/ha)	8646	8704	8570	8735	**9549**
Índice de Cosecha	**0.365**	**0.370**	**0.377**	0.385	0.328
Espigas/m^{-2}	**535**	**551**	550	**523**	**510**
Granos/espiga	16.3	**16.6**	**18.5**	18.3	17.8
Peso de mil granos (g)	43.2	**45.7**	40.4	40.0	37.7
1a.+2a.	90.7	**94.8**	86.6	84.3	80.2

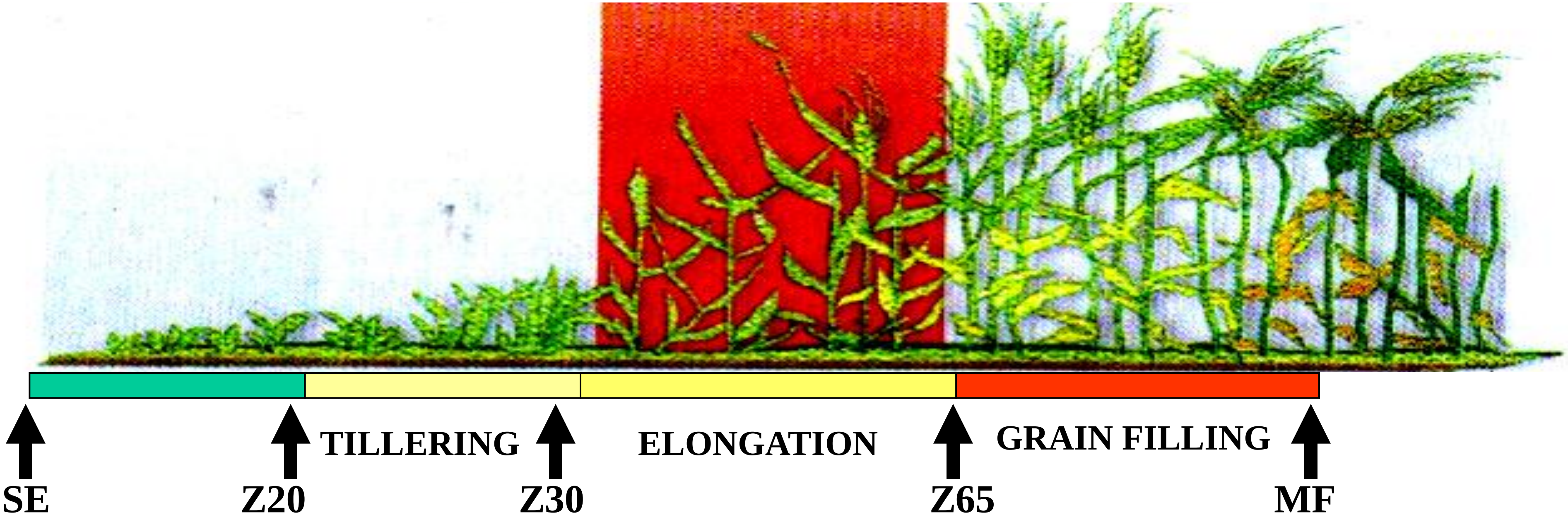
Castro et al., 1997

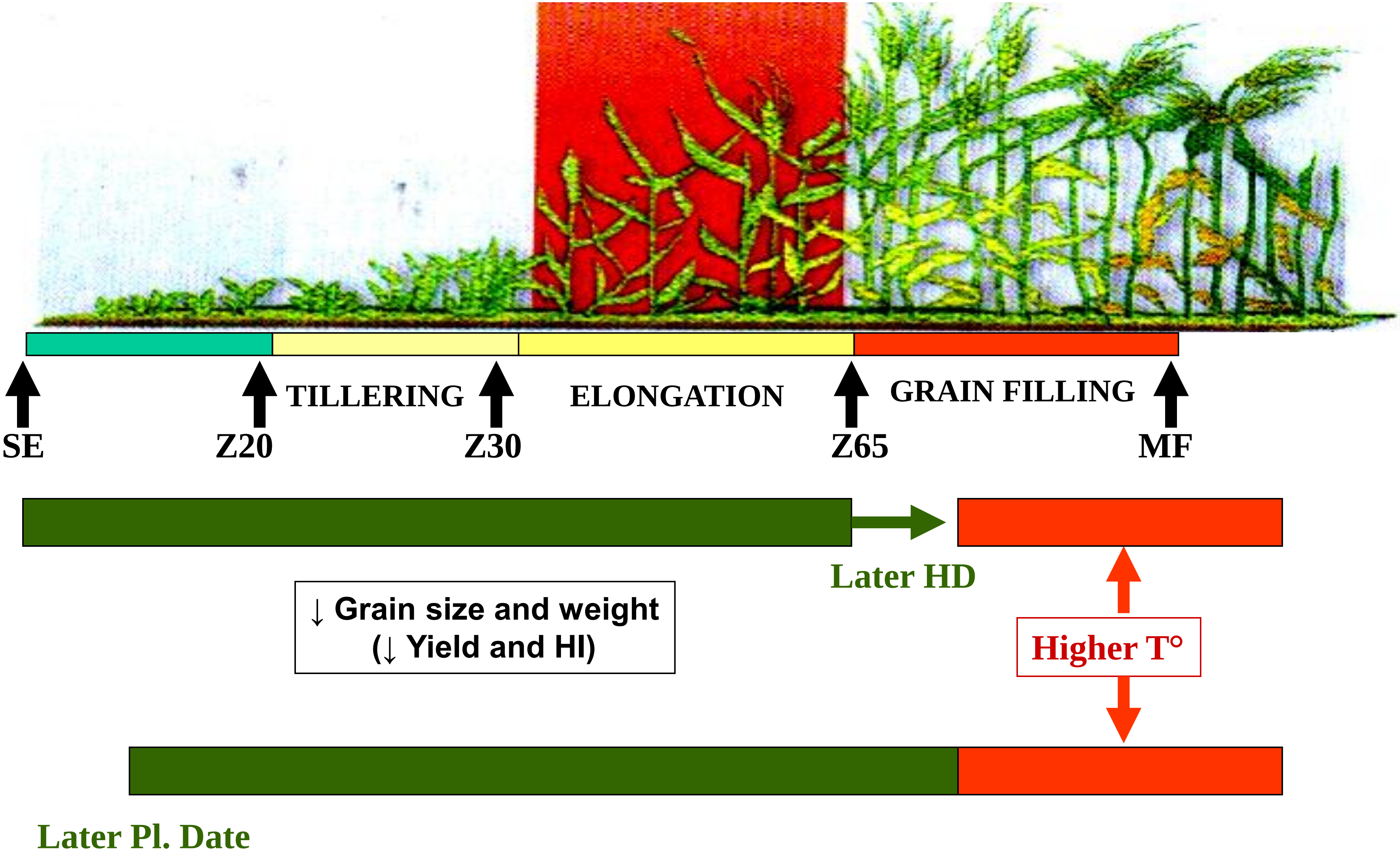


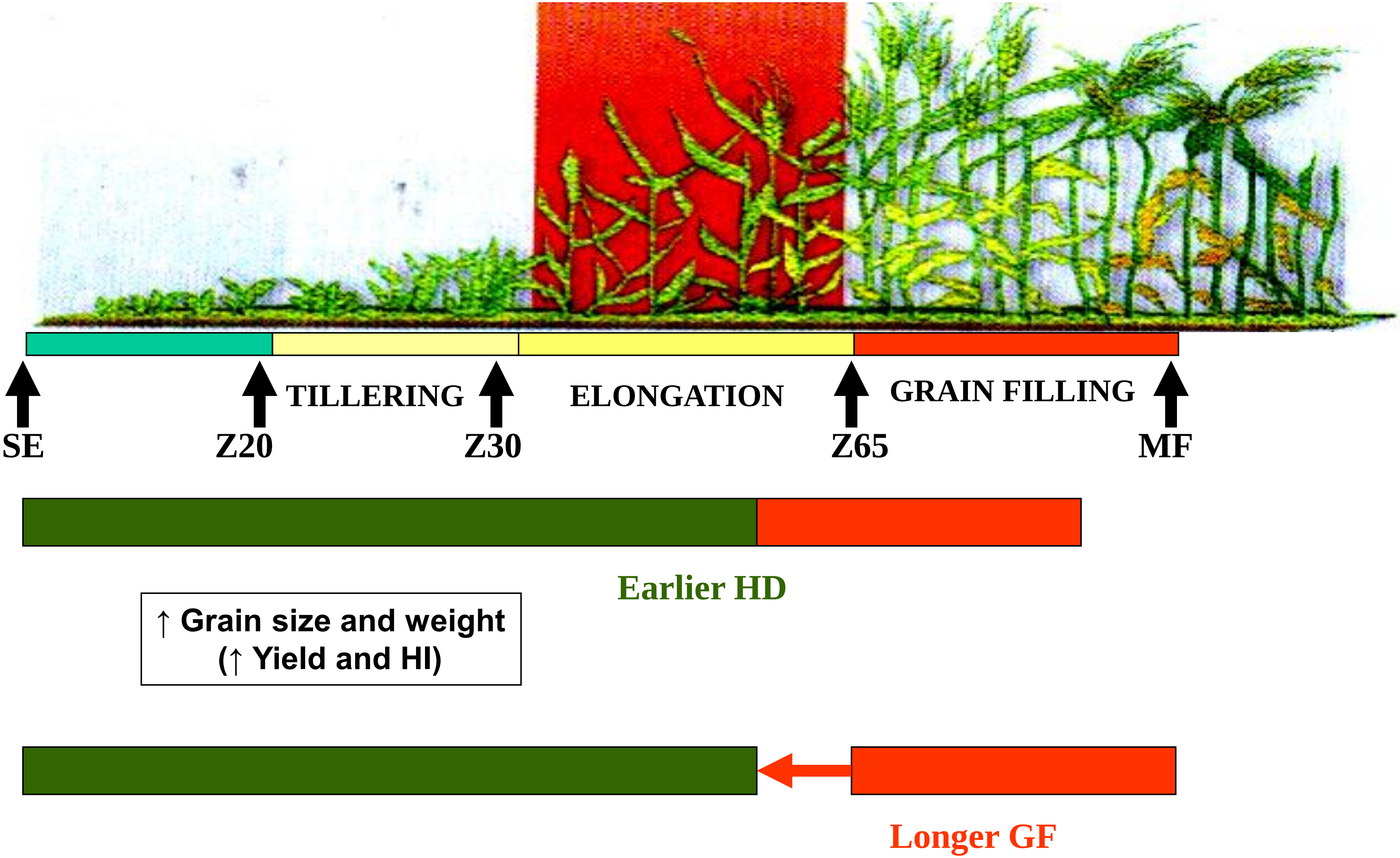


Cultivares de cebada utilizados en experimentos de chacra (Red Nitrógeno, 2008) y concentración por época de siembra

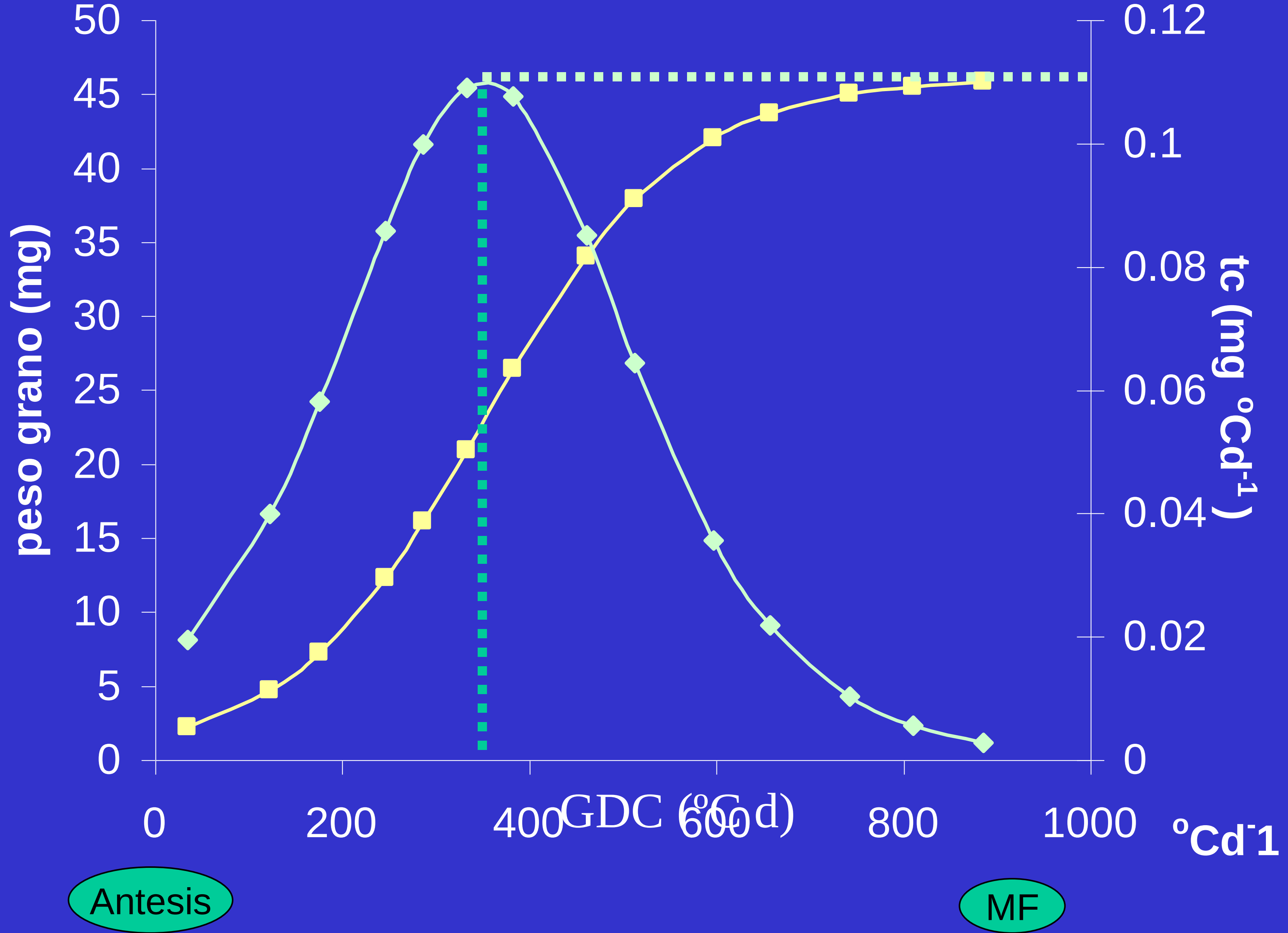
Fuente: Hoffman y Baeten sp

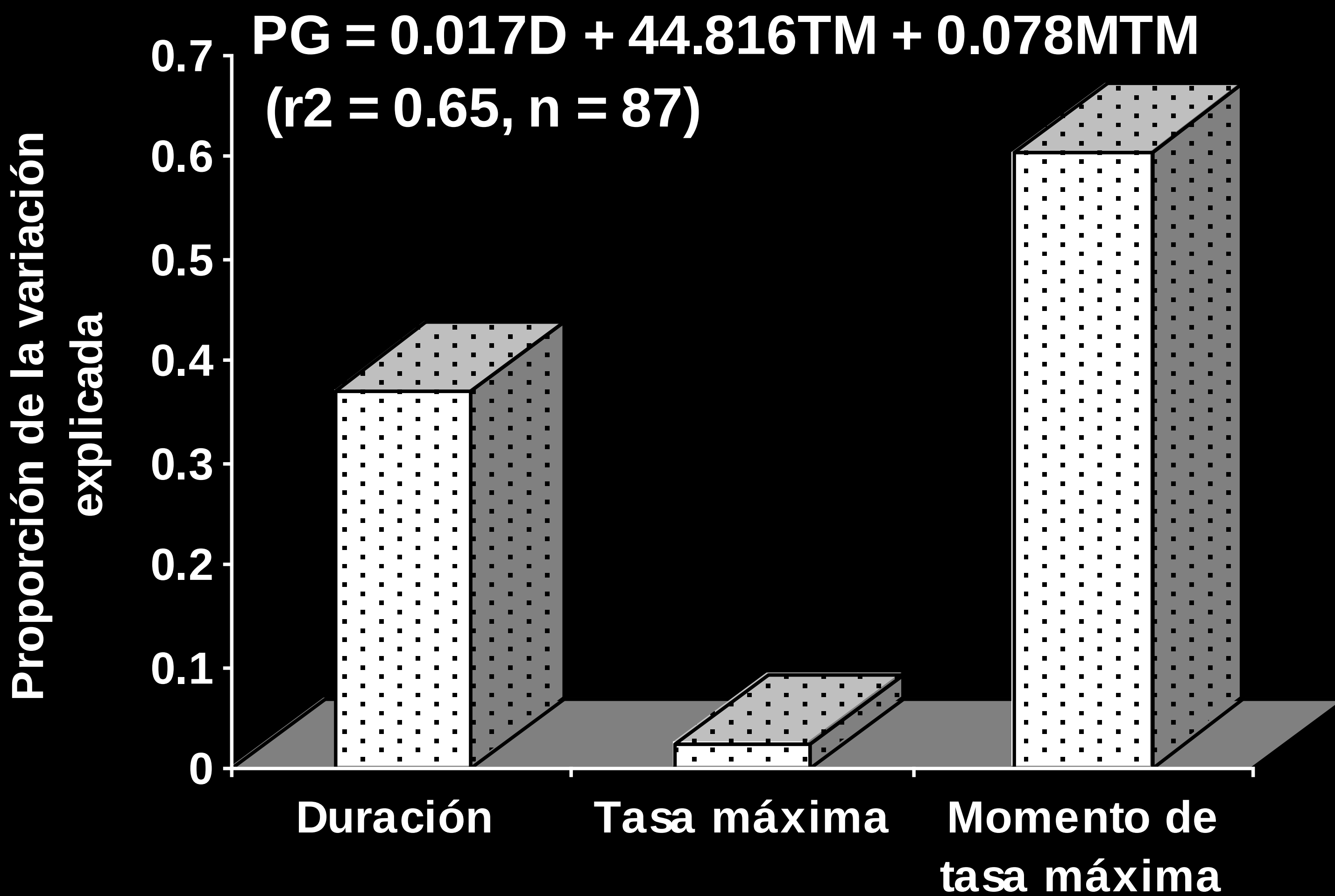

TILLERING
ELONGATION
GRAIN FILLING
SE
Z20
Z30
Z65
MF


TILLERING
ELONGATION
GRAIN FILLING
SE
Z20
Z30
Z65
MF
Later HD
↓ Grain size and weight
(↓ Yield and HI)
Higher T°
Later Pl. Date


TILLERING
ELONGATION
GRAIN FILLING
SE
Z20
Z30
Z65
MF
Earlier HD
↑ Grain size and weight
(↑ Yield and HI)
Longer GF

Crecimiento de Grano



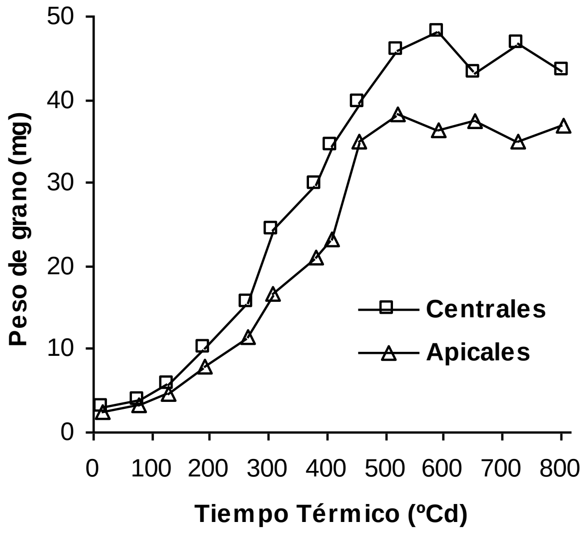

PG = 0.017D + 44.816TM + 0.078MTM
(r2 = 0.65, n = 87)
Proporción de la variación explicada
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Duración
Tasa máxima
Momento de tasa máxima

Caracterización varietal de acuerdo al peso de grano (PG) (mg), duración, momento de tasa máxima (MTM), tasa máxima (TM), coeficiente de estabilidad (b) y sensibilidad del peso de los granos apicales (SA). Tres años dos épocas de siembra (temprana en el sur, tardío en el norte)

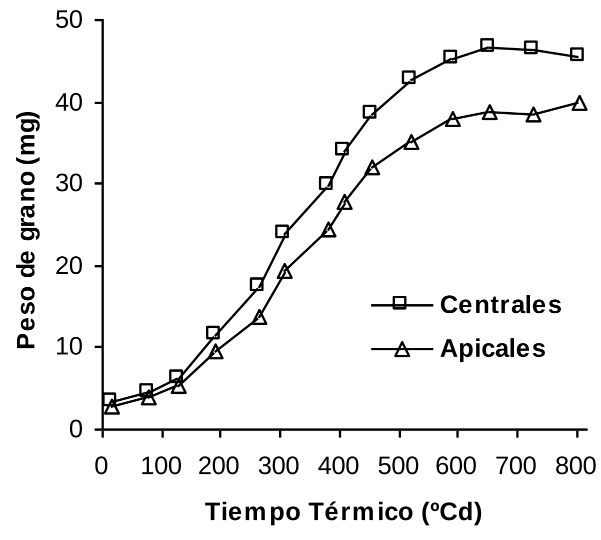
Cultivar	PG	Duración	MTM	TM	b	SA
Bowman	45.3	Media	medio	Baja	> 1	medio
Clipper	42.7	Corta	temprano	Alta	< 1	bajo
FNC6-1	45.5	Media	tardío	Alta	= 1	alto
Mn599	45.0	Corta	medio	Alta	> 1	alto
E. Quebracho	44.5	Larga	tardío	Baja	< 1	bajo

Duración (ºCd): corta: < 600; media: 600 - 650; larga: > 650.
MTM (ºCd): temprano: < 320; medio: 320 - 340; tardío: > 340.
TM (mg/ºCd): bajo: < 0.102; alto: > 0.106.

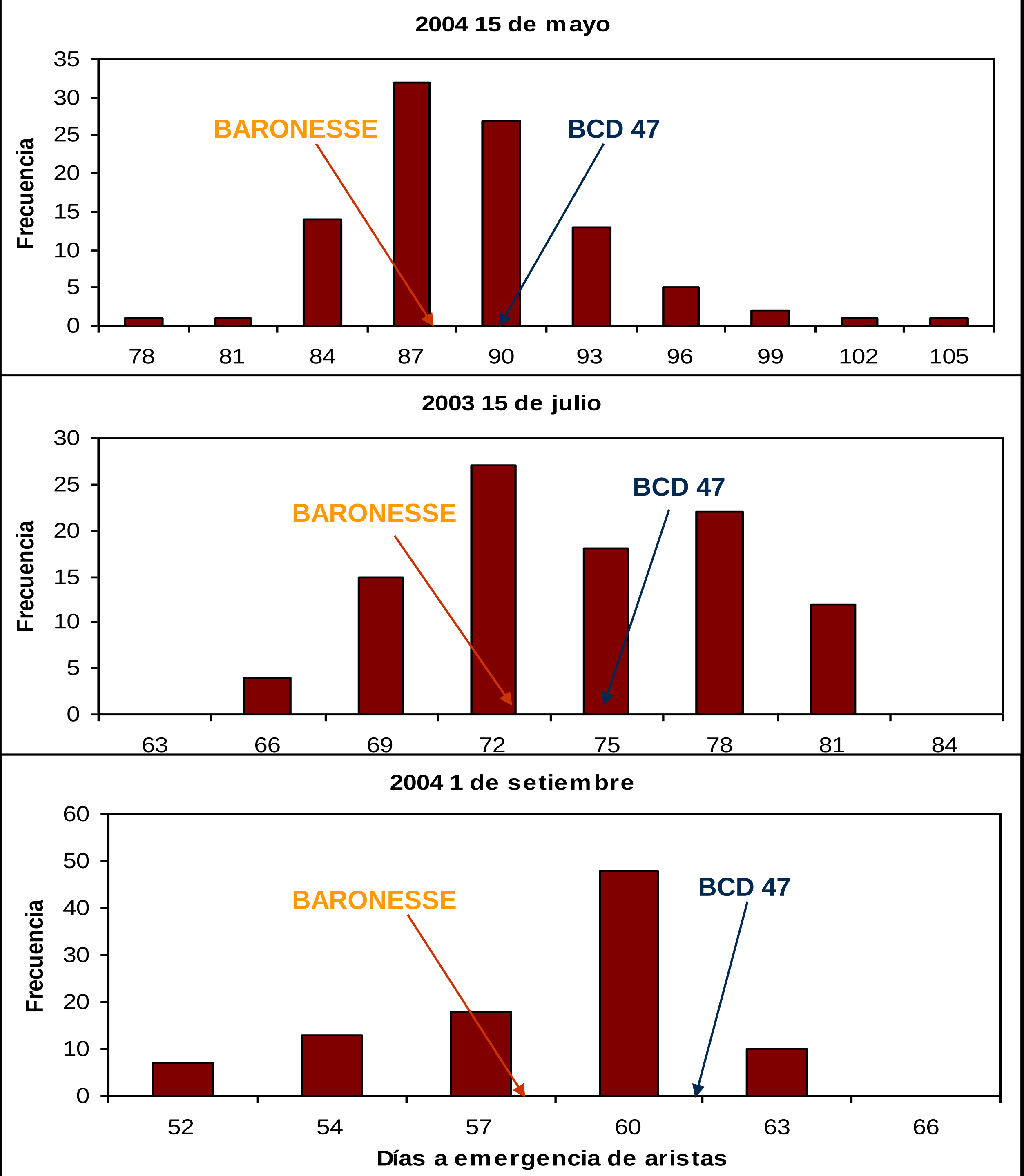
c) FNC6-1, EEMAC 96



d) Quebracho, EEMAC 96



ANTHESIS



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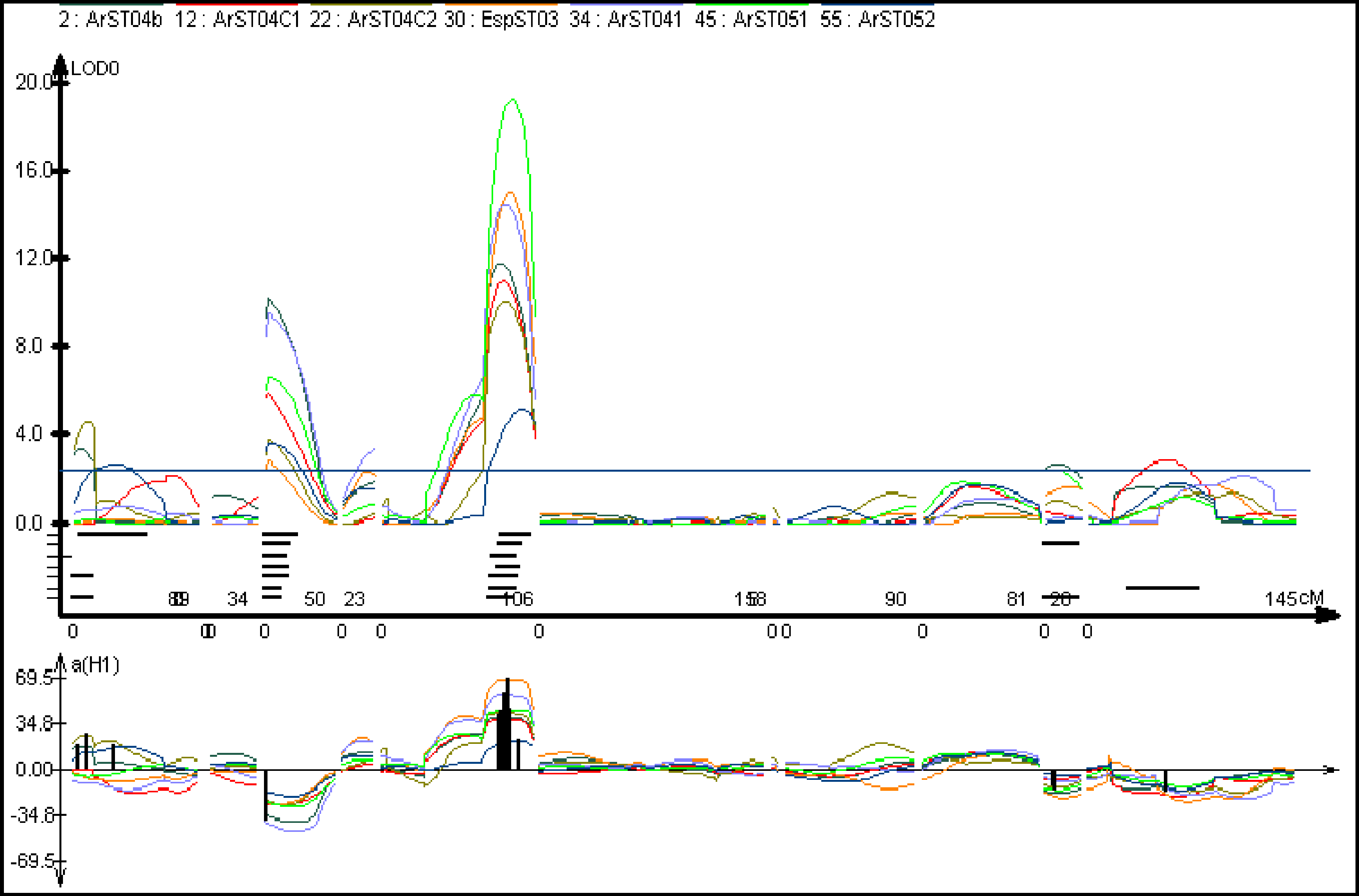
FENOLOGIA



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Phenotypic correlations of agronomic traits with Heading Date (BARONESSE/BCD47)

	Grain weight	Grain plumpness
July 17th, 2003	-0.616	-0.611
June 15th, 2004	-0.554	-0.634
August 1st, 2004	-0.618	-0.590
July 12th, 2005	-0.660	-0.670
August 31st, 2005	-0.621	-0.567

Alelos presentes		Ciclo	PMG	P12
QTL 2H	QTL 3H			
BCD47	**Baronesse**	**73.1**	**47.5**	**86.1**
BCD47	BCD47	**77.4**	**43.5**	**76.3**
Baronesse	Baronesse	**77.3**	**43.4**	**74.1**
Baronesse	BCD47	**81.6**	**38.8**	**60.2**
Baronesse		**80.5**	**42.3**	**77.8**
BCD47		**83.9**	**44.3**	**65.5**

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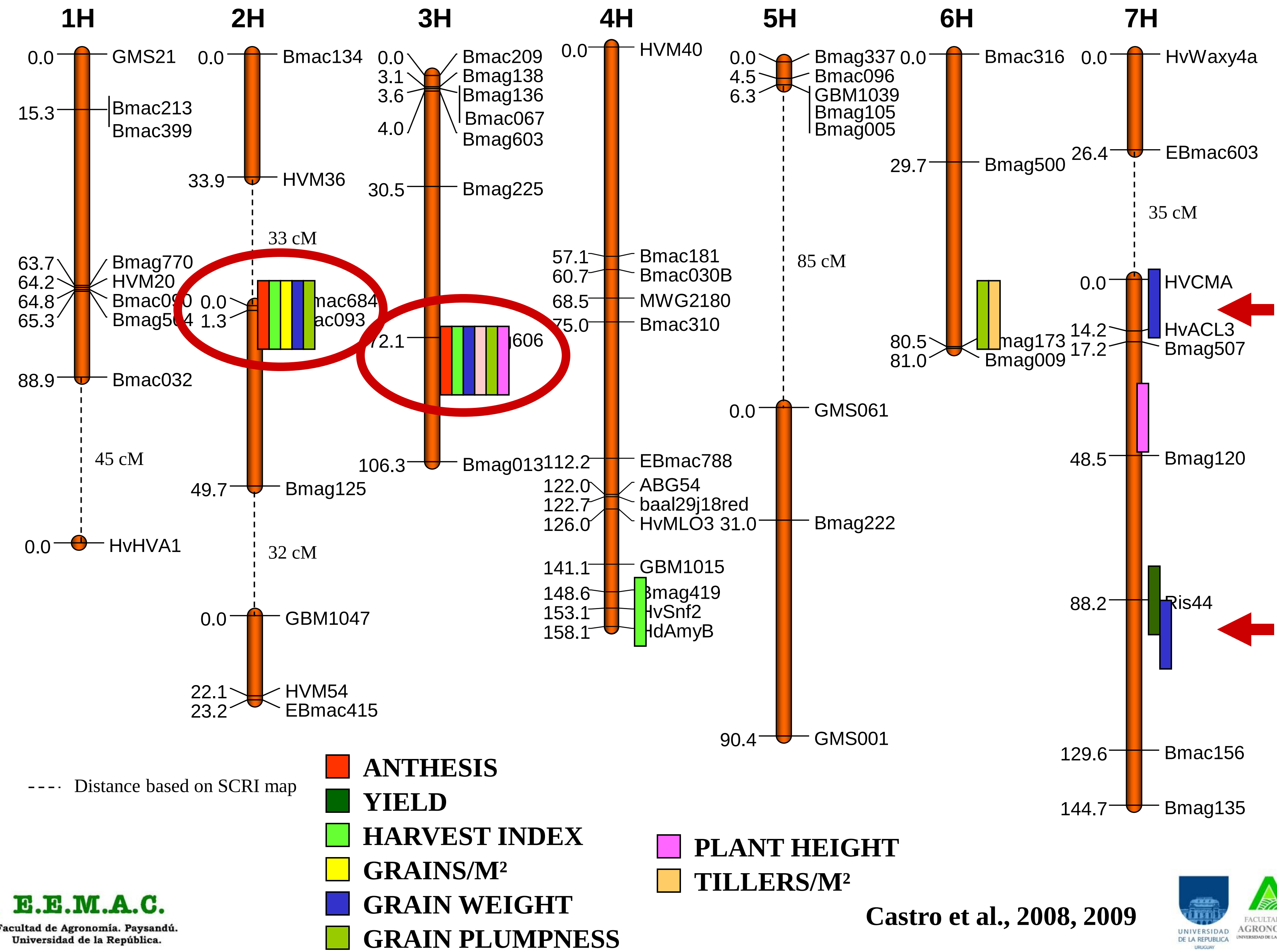
BARONESSE X BCD47



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Castro et al., 2008, 2009

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FENOLOGIA EN LA POBLACION BCD47/BARONESSE

- Dos QTL responsables de la mayor parte de la variación (2H y 3H)
- Genes candidatos: ***eps2S*** y ***denso***
- Completa aditividad

- ¿Posibilidad de continuar la acumulación de alelos favorables?
- ¿Especificidad en los efectos?

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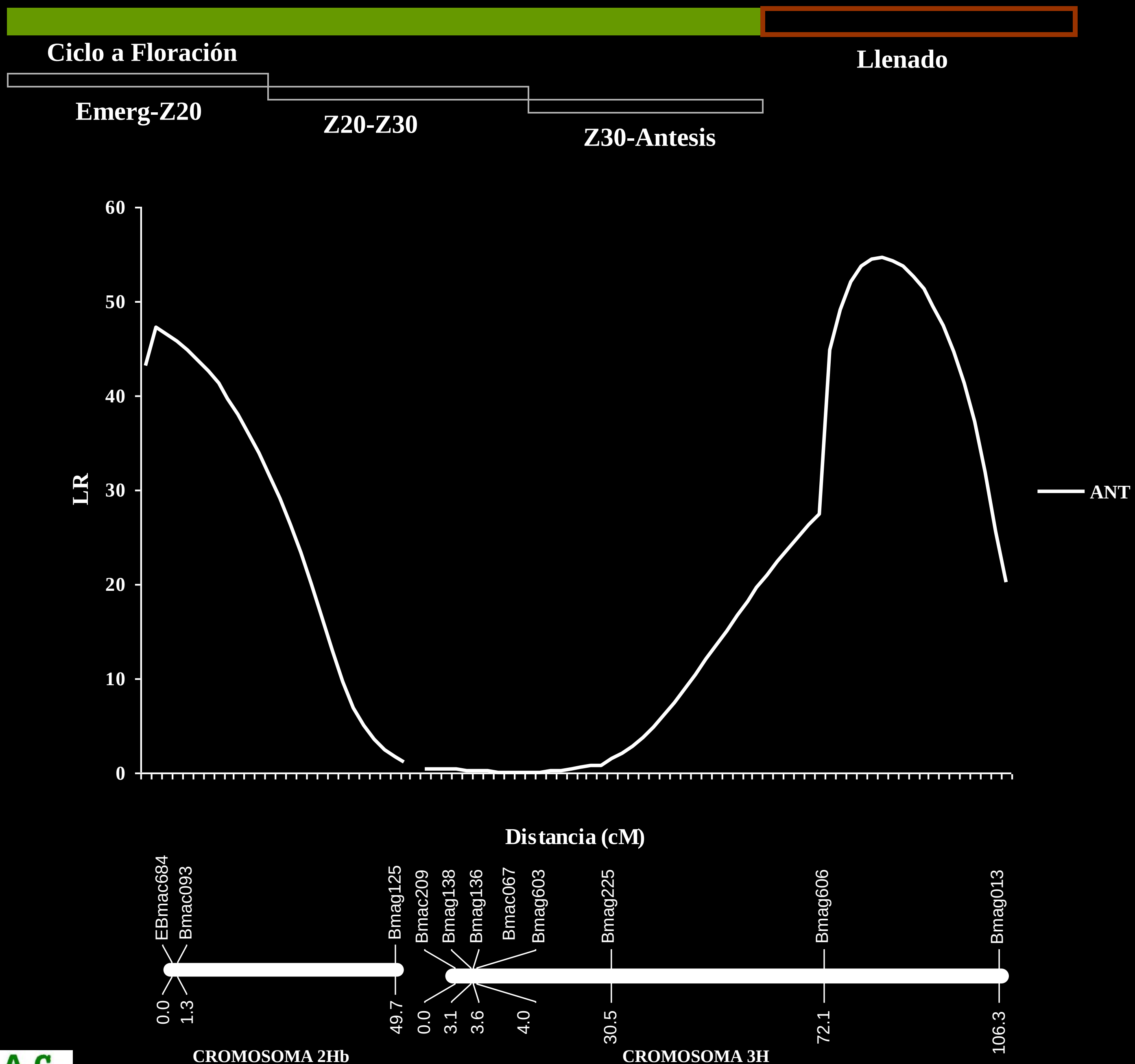

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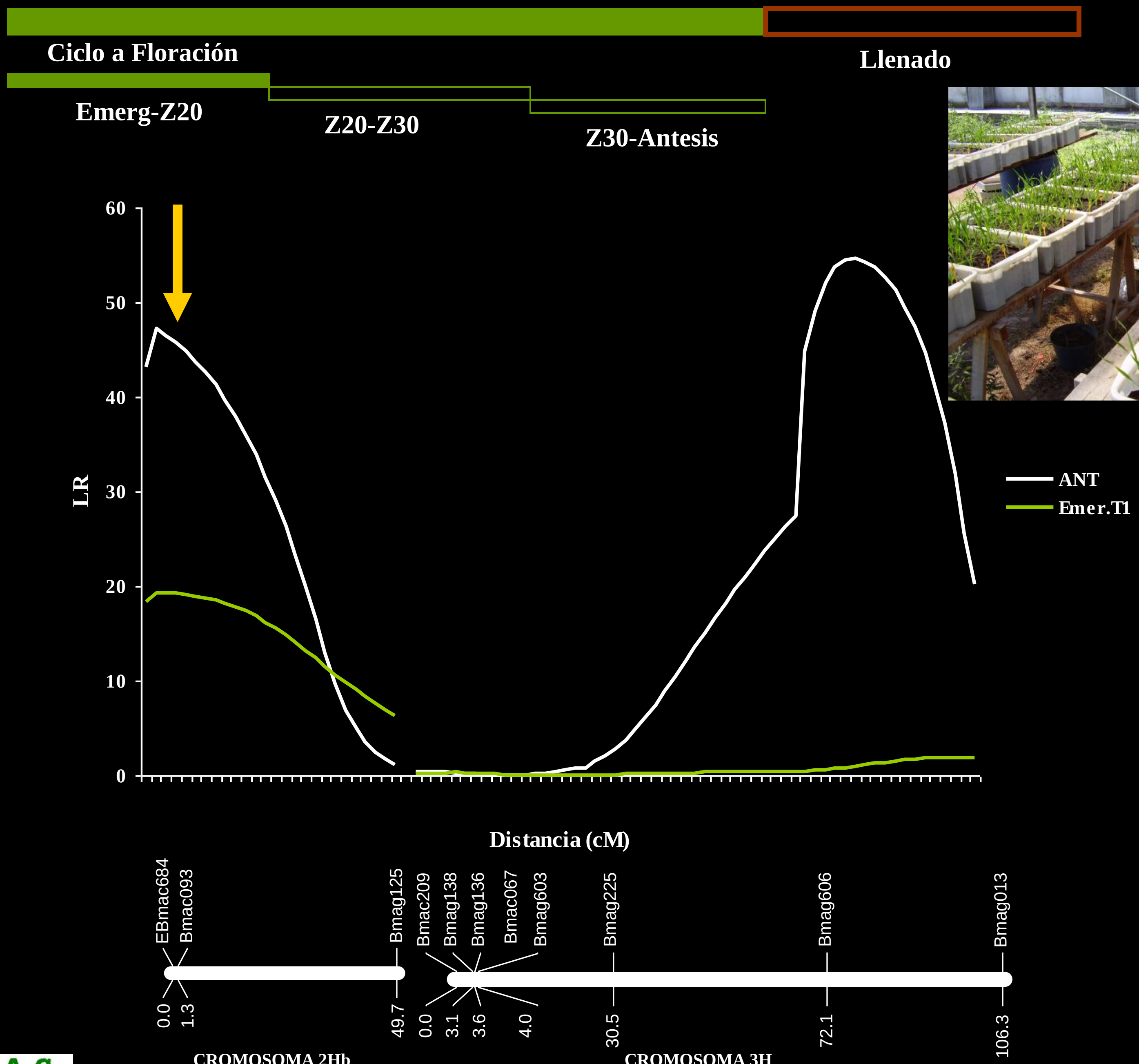
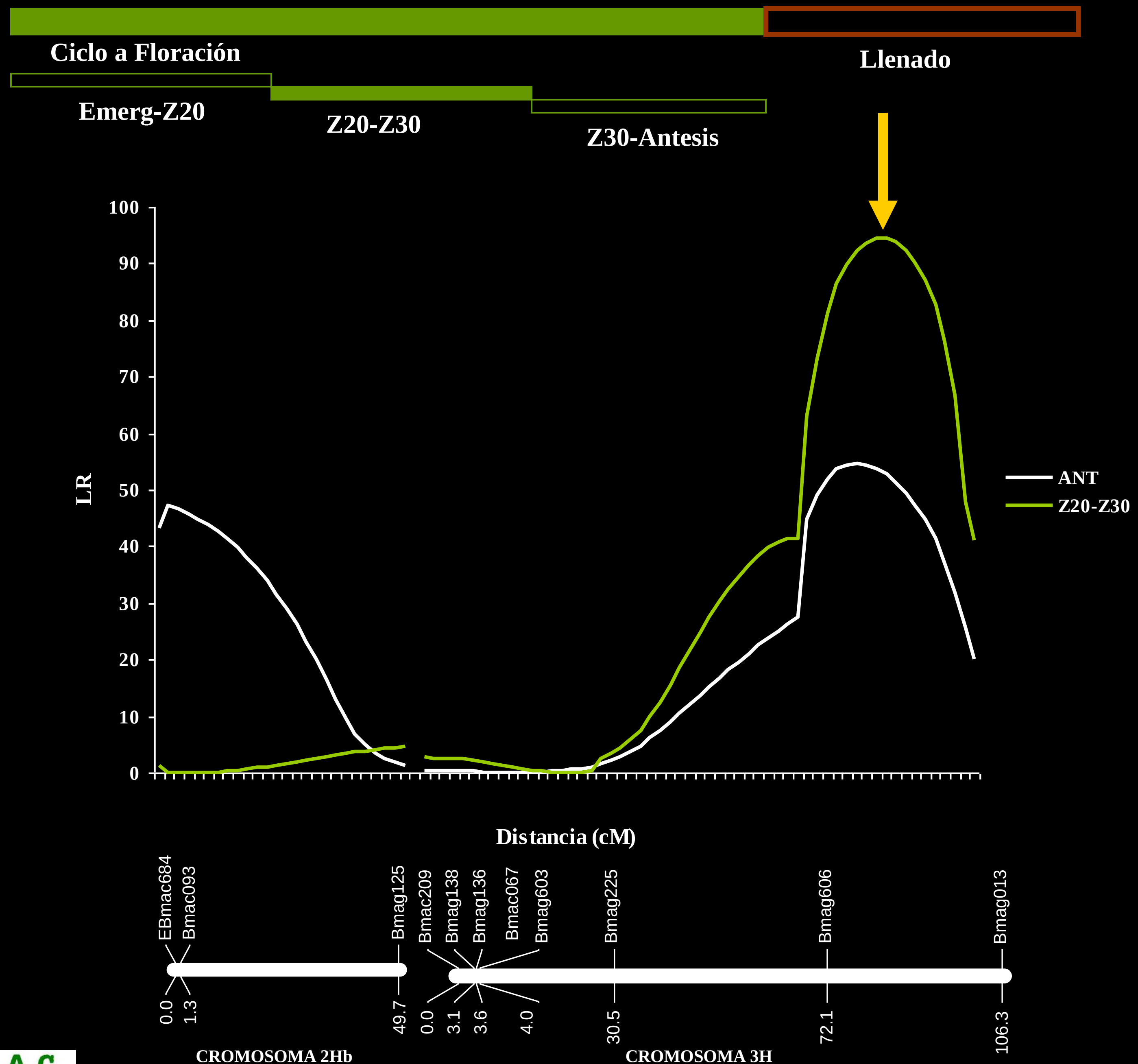

Ciclo a Floración
Llenado
Emerg-Z20
Z20-Z30
Z30-Antesis
60
50
40
30
20
10
0
LR
ANT
Emer.T1
Distancia (cM)
EBmac684
Bmac093
Bmag125
Bmac209
Bmag138
Bmag136
Bmac067
Bmag603
Bmag225
Bmag606
Bmag013
0.0
1.3
49.7
0.0
3.1
3.6
4.0
30.5
72.1
106.3
CROMOSOMA 2Hb
CROMOSOMA 3H



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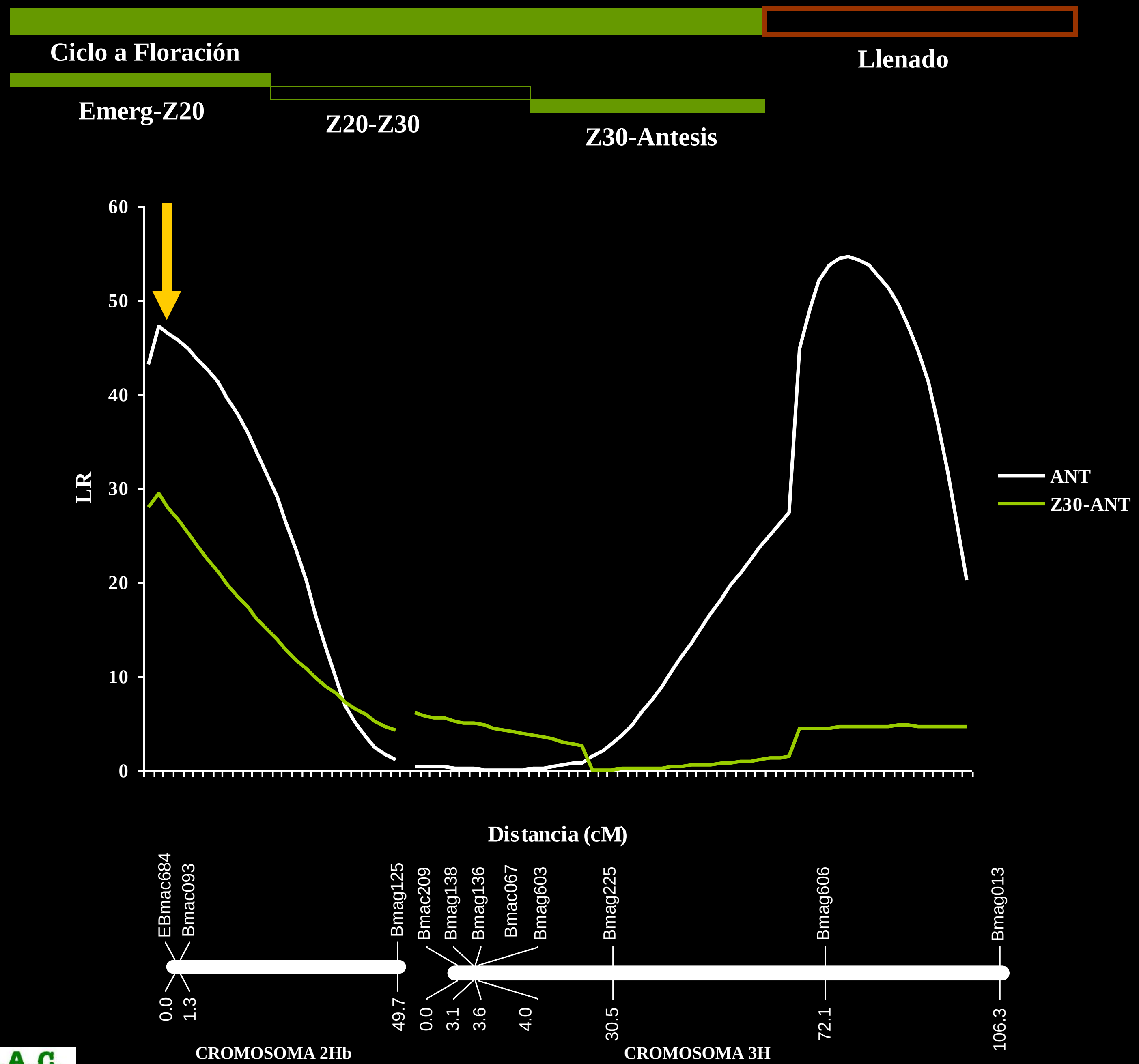

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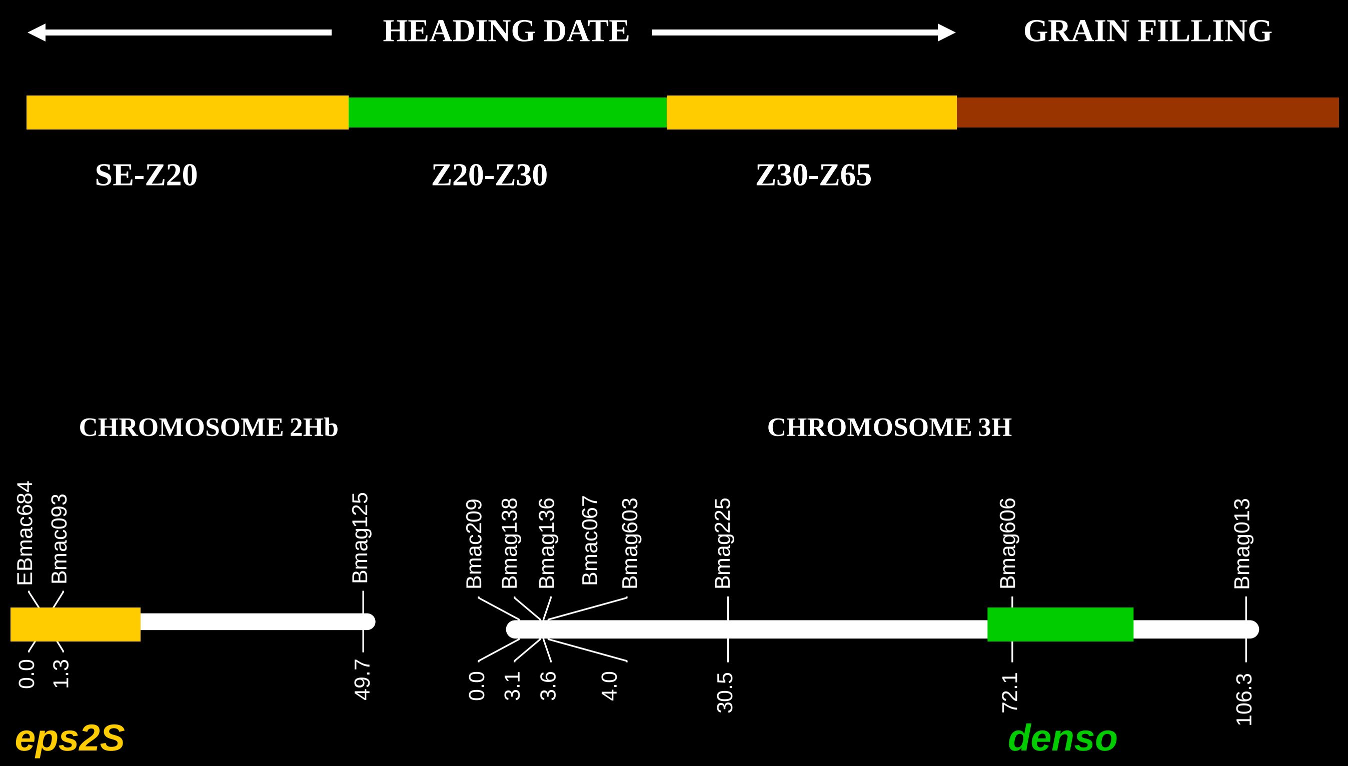

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Población Henni/Meltan (Borras et al., 2010)

- Ciclo a Antesis

- Periodos analizados: Fase de iniciación de hojas y espiguillas (FHE), Fase de elongación (FEl)

- Emergencia de hojas, filocron, dinámica de macollaje

Field Crops Research 119 (2010) 36–47

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ELSEVIER

Genetic control of pre-heading phases and other traits related to development in a double-haploid barley (*Hordeum vulgare* L.) population

Gisela Borràs-Gelonch[a,*], Gustavo A. Slafer[a,b], Ana M. Casas[c], Fred van Eeuwijk[d], Ignacio Romagosa[a]

[a] Department of Crop and Forest Sciences, University of Lleida, Centre UdL-IRTA, Av. Rovira Roure 191, 25198 Lleida (Catalonia), Spain
[b] ICREA (Catalonian Institution for Research and Advanced Studies), Spain
[c] Department of Genetics and Plant Production, Aula Dei Experimental Station, CSIC, Zaragoza, Spain
[d] Wageningen University, Biometris, Department of Plant Sciences, P.O. Box 100, 6700 AC Wageningen, The Netherlands

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ABSTRACT

Extending the phase of stem elongation (SE) has been proposed as a tool to further improve yield potential in small-grain cereals. The genetic control of pre-heading phases may also contribute to a better understanding of phenological traits conferring adaptability. Given that an optimized total time to heading is one of the most important traits in a breeding program, a prerequisite for lengthening SE would be that this and the previous phase (leaf and spikelet initiation, LS) should be under different genetic control. We studied the genetic control of these two pre-heading sub-phases (from sowing to the onset of stem elongation, LS, and from then to heading, SE) in terms of Quantitative Trait Loci (QTL) in a barley double-haploid population derived from the cross Henni × Meltan, both two-rowed spring North European barley cultivars. DH lines (118) and their parents were studied in four field trials in North-Eastern Spain. Genetic control of a number of traits related to leaf appearance and tillering dynamics, which could be important for an early crop canopy structure, were also studied. LS and SE are, at least partially, under a different genetic control in the Henni × Meltan population, mainly due to a QTL on chromosome 2HS. The QTLs responsible for a different control of LS and SE did not seem to correspond with any major gene reported in the literature. Moreover shortening LS, so as to lengthen SE without modifying heading date, would not necessarily imply a negative drawback on traits that could be important for early vigour, such as phyllochron and the onset of tillering.

1. Introduction

Crop phenology, which allows matching crop development with availability of resources (water, radiation, etc.), is the most important single factor influencing yield and crop adaptation to particular environments (Richards, 1991). This is especially relevant in Mediterranean conditions, where water is the main limiting factor and the occurrence of terminal drought and possible late spring frosts defines an optimal window for time to anthesis in order to maximize yield (Richards, 1991; Loss and Siddique, 1994; Cuesta-Marcos et al., 2009). Therefore keeping or achieving an optimised time to flowering is still an important goal in any breeding programme. In some Mediterranean environments, where intensive breeding has been carried out for centuries, either through farmer's selection or breeding programmes, there could be little scope for improving barley adaptability and yield by further adjustments in time to heading (Marinciello et al., 1987; Muñoz et al., 1998; Slafer et al., 2005). However, knowing the genetic control of different pre-anthesis phases may contribute to a better understanding of phenological traits conferring adaptability (e.g. Limin et al., 2007).

Fine adjustment of phenology could be also important for yield improvement through increasing yield potential. Lengthening duration of the stem elongation phase has been associated to increases in the number of grains/m² (Slafer et al., 2001, 2005) which in turn could increase yield potential of small-grain cereals (Fischer, 2007, 2008; Miralles and Slafer, 2007). This should be achieved without modifying total time to anthesis, whose optimisation as shown above, is an important objective providing adaptability in breeding programmes (Slafer, 2003). To attain this goal, a prerequisite would be that the phases before and after the onset of stem elongation should be under different genetic control, as earlier suggested by some authors (Halloran and Pennell, 1982; Slafer and Rawson, 1994; Kernich et al., 1997).

Given the importance of time to anthesis, the genetic control of this trait has been the focus of many studies. Several genes or loci related to the response to photoperiod or vernalisation, or to earliness per se (the three main factors determining head-

* Corresponding author.
E-mail address: gisela.borras@pvcf.udl.cat (G. Borràs-Gelonch).

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E.E.M.A.C.
Facultad de Agronomía. Paysandú.
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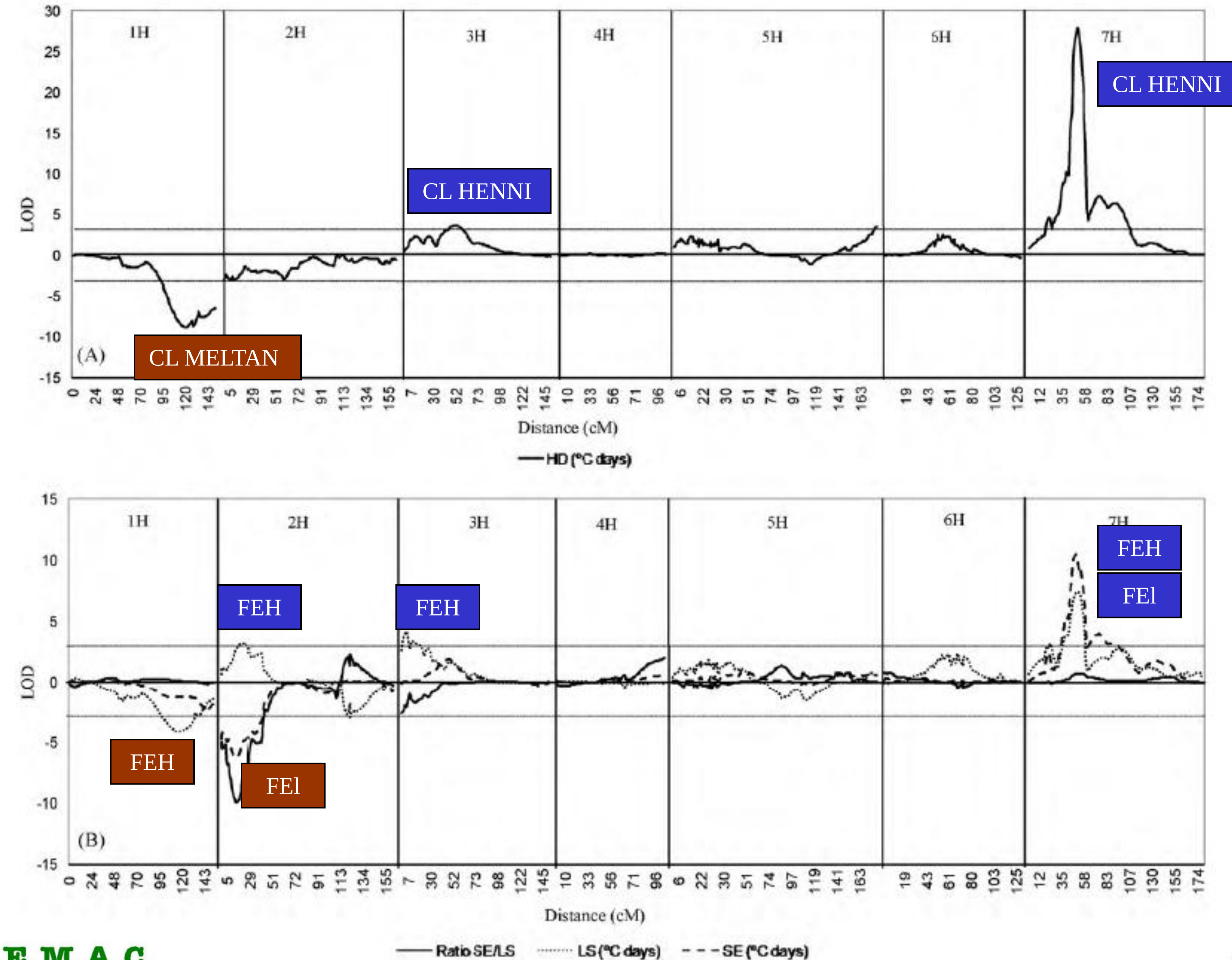

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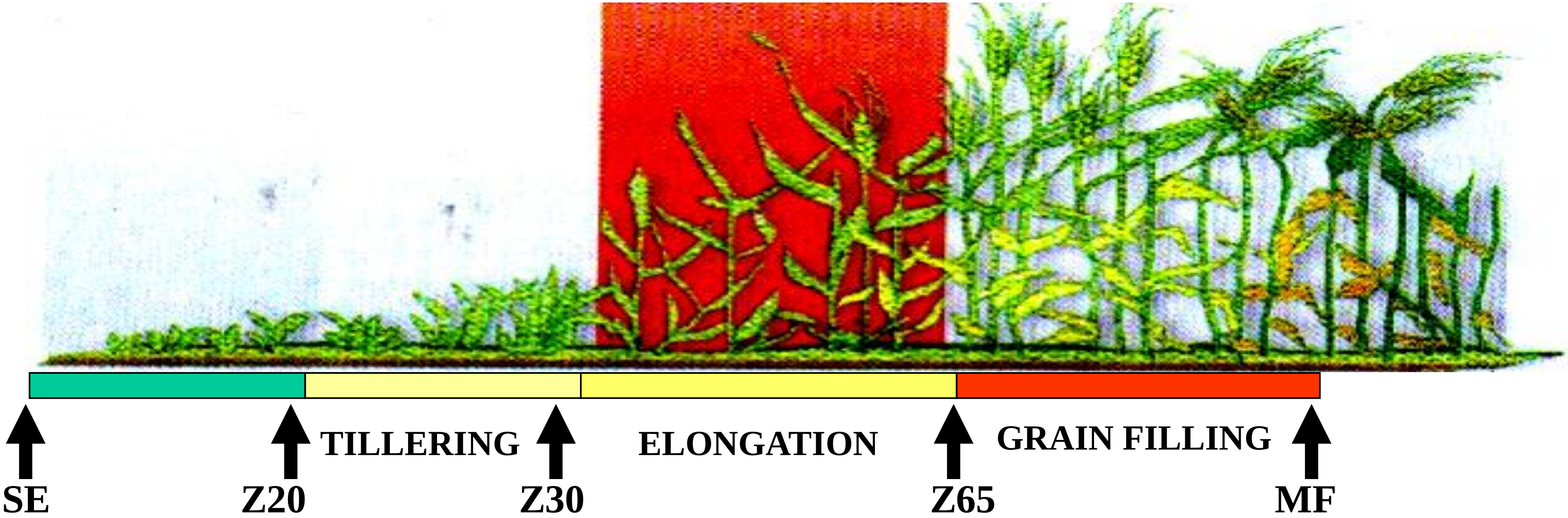

TILLERING
ELONGATION
GRAIN FILLING
SE
Z20
Z30
Z65
MF

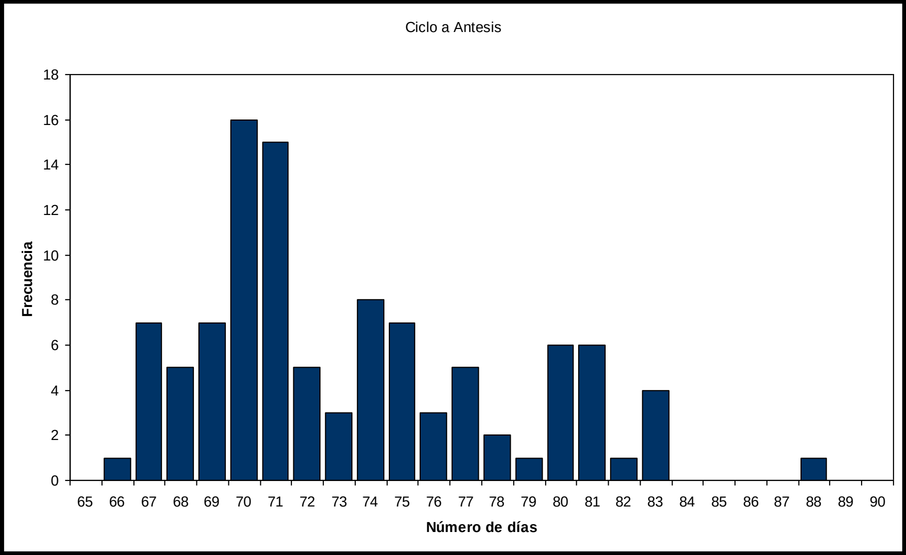
Proyecto: INIA-FPTA (2007-2009)

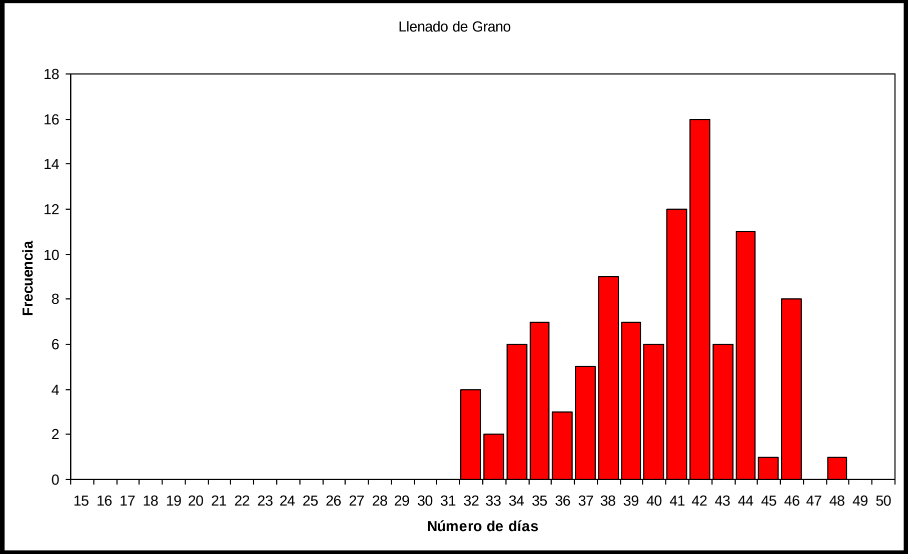
Caracterización genómica del germoplasma de cebada, por variables de calidad maltera, agronómicas y sanitarias.

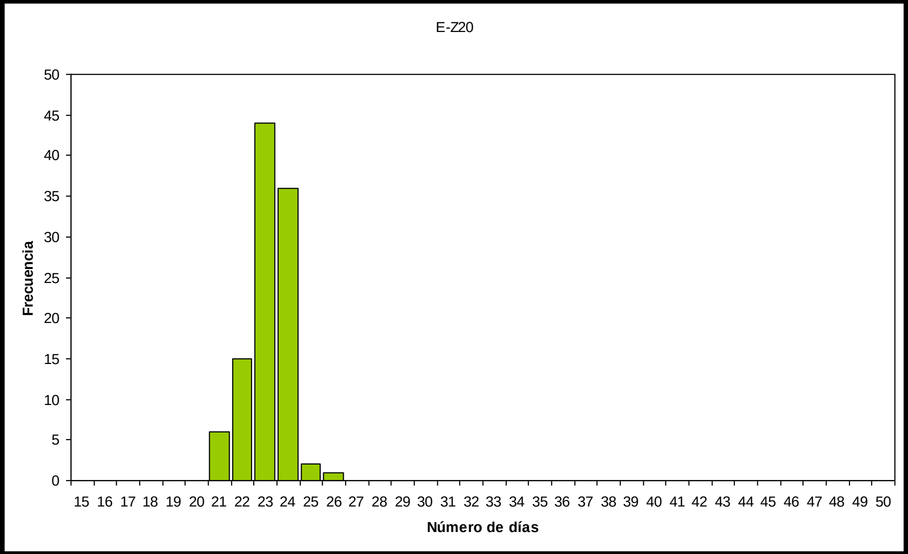
77 genotypes

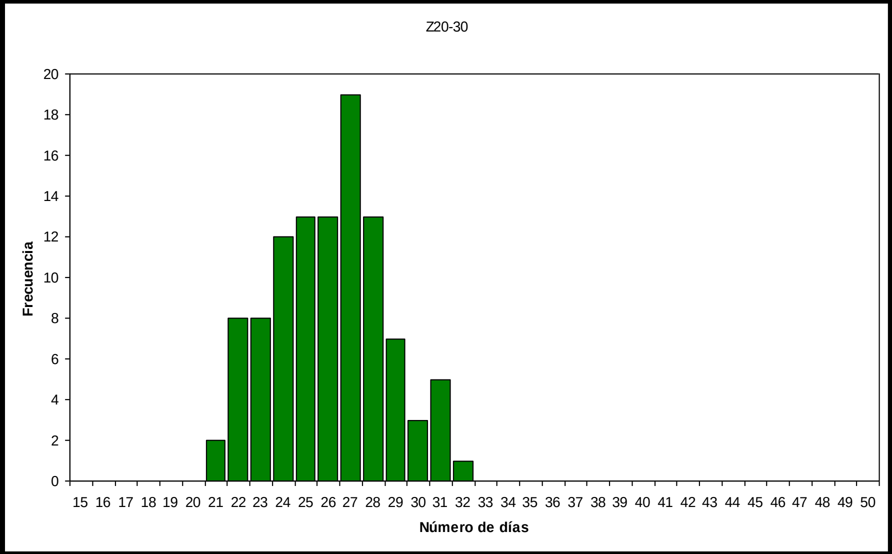
- **Varieties used in Uruguay (1930-2005)**
- **Quality sources**
- **Ancestors**
- **Experimental lines**

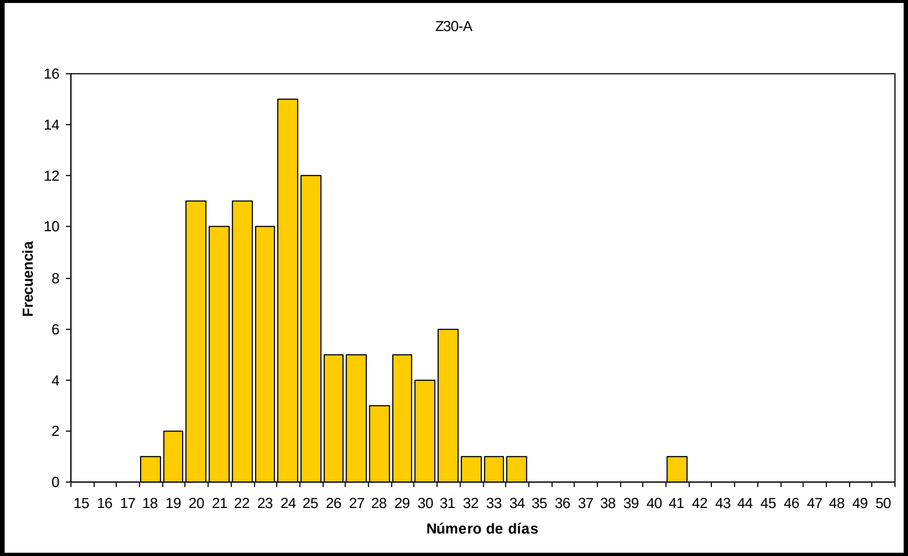
SNPs (1033, Illumina BOPA1)

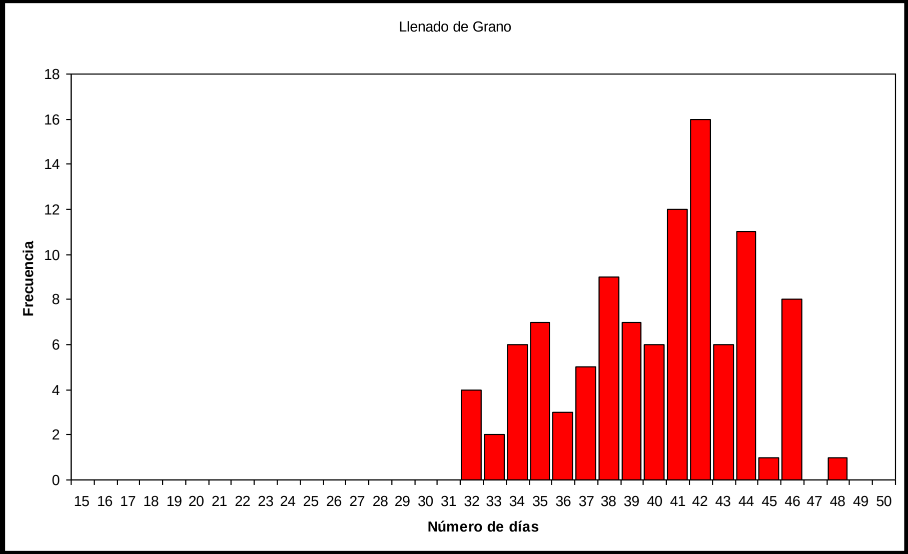

Ciclo a Antesis
Frecuencia
Número de días
0 2 4 6 8 10 12 14 16 18
65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90


Llenado de Grano
Frecuencia
Número de días
0 2 4 6 8 10 12 14 16 18
15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50

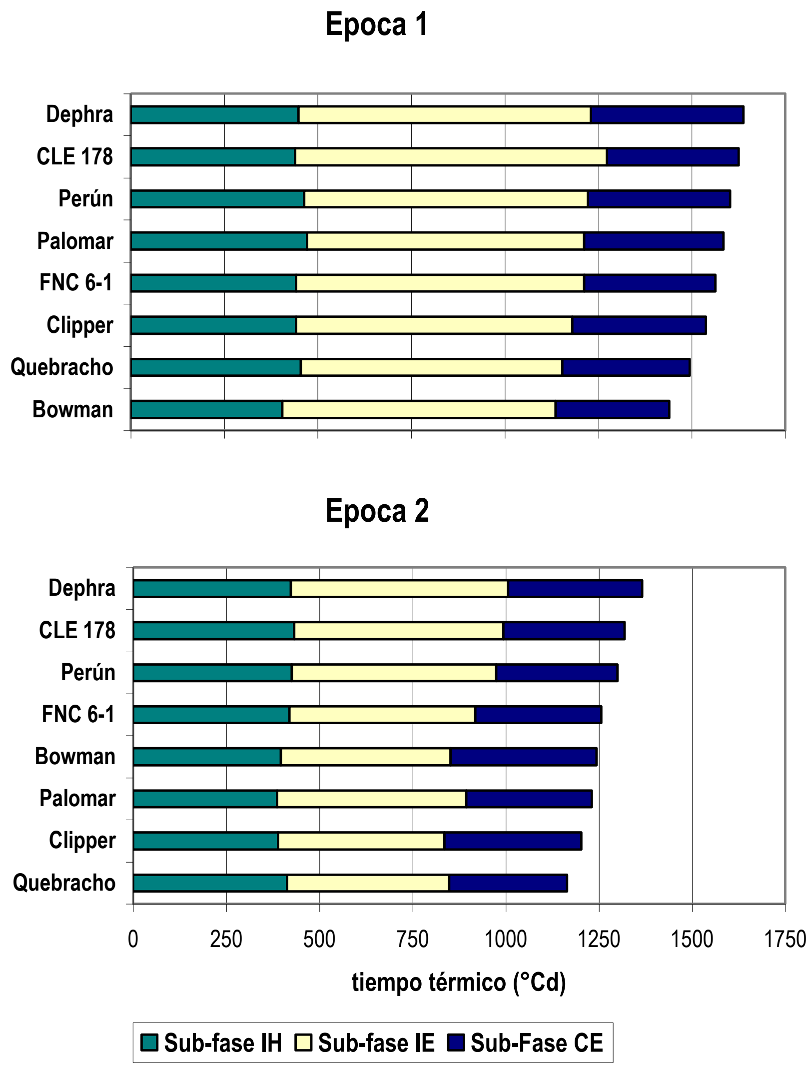

E-Z20
Frecuencia
Número de días


Z20-30
Frecuencia
Número de días

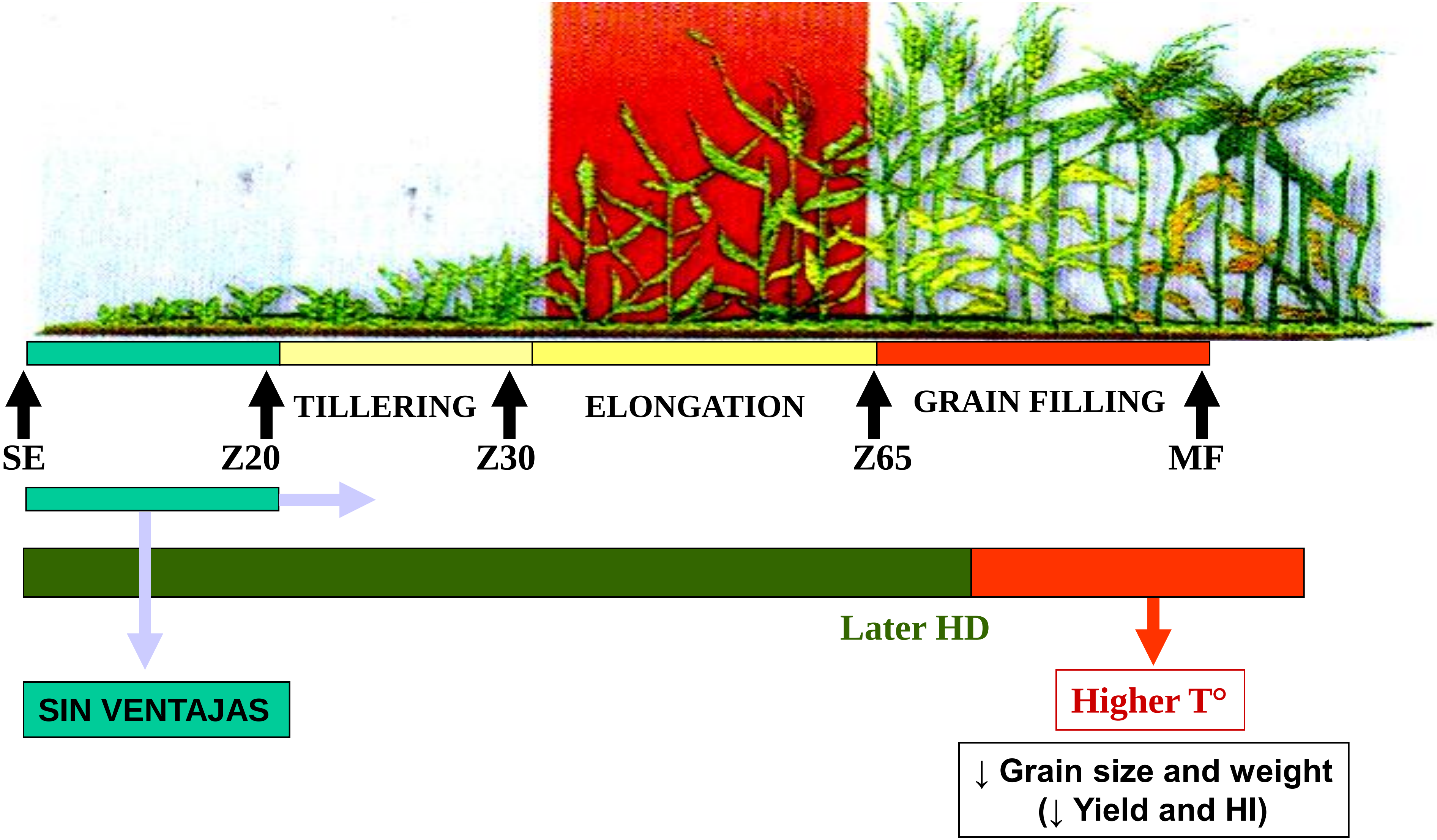

Z30-A
Frecuencia
Número de días

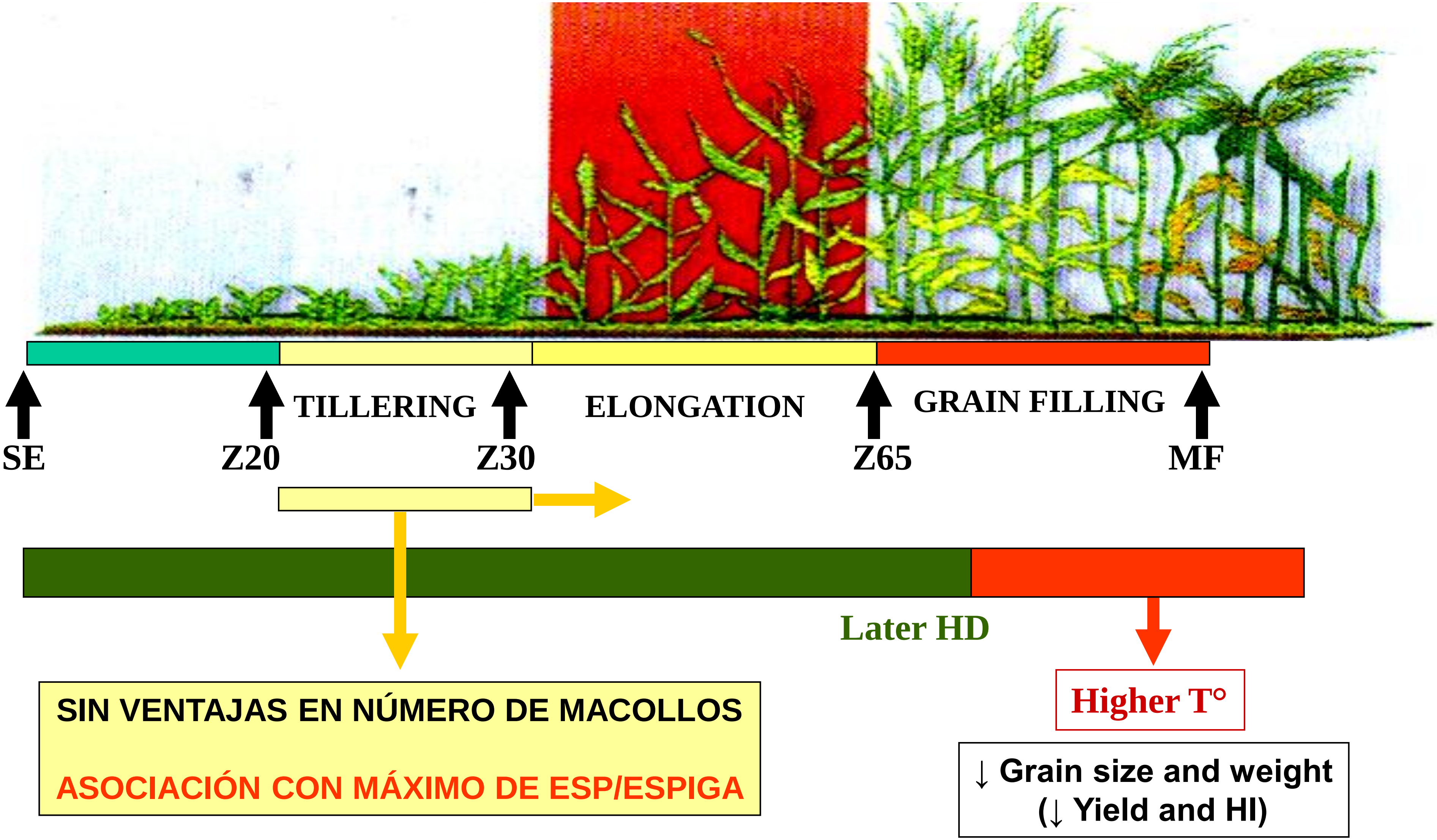

Llenado de Grano
Frecuencia
Número de días

Descomposición y variaciones de las subfases a antesis



Duración del ciclo siembra floración y de las sub-fases iniciación de hojas (IH), iniciación de espiguillas (IE) y crecimiento de espiguillas (CE), según cultivar y época de siembra en el año 1998 (González y Xavier, 2000).


TILLERING
ELONGATION
GRAIN FILLING
SE
Z20
Z30
Z65
MF
Later HD
SIN VENTAJAS
Higher T°
↓ Grain size and weight
(↓ Yield and HI)



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Facultad de Agronomía. Paysandú.
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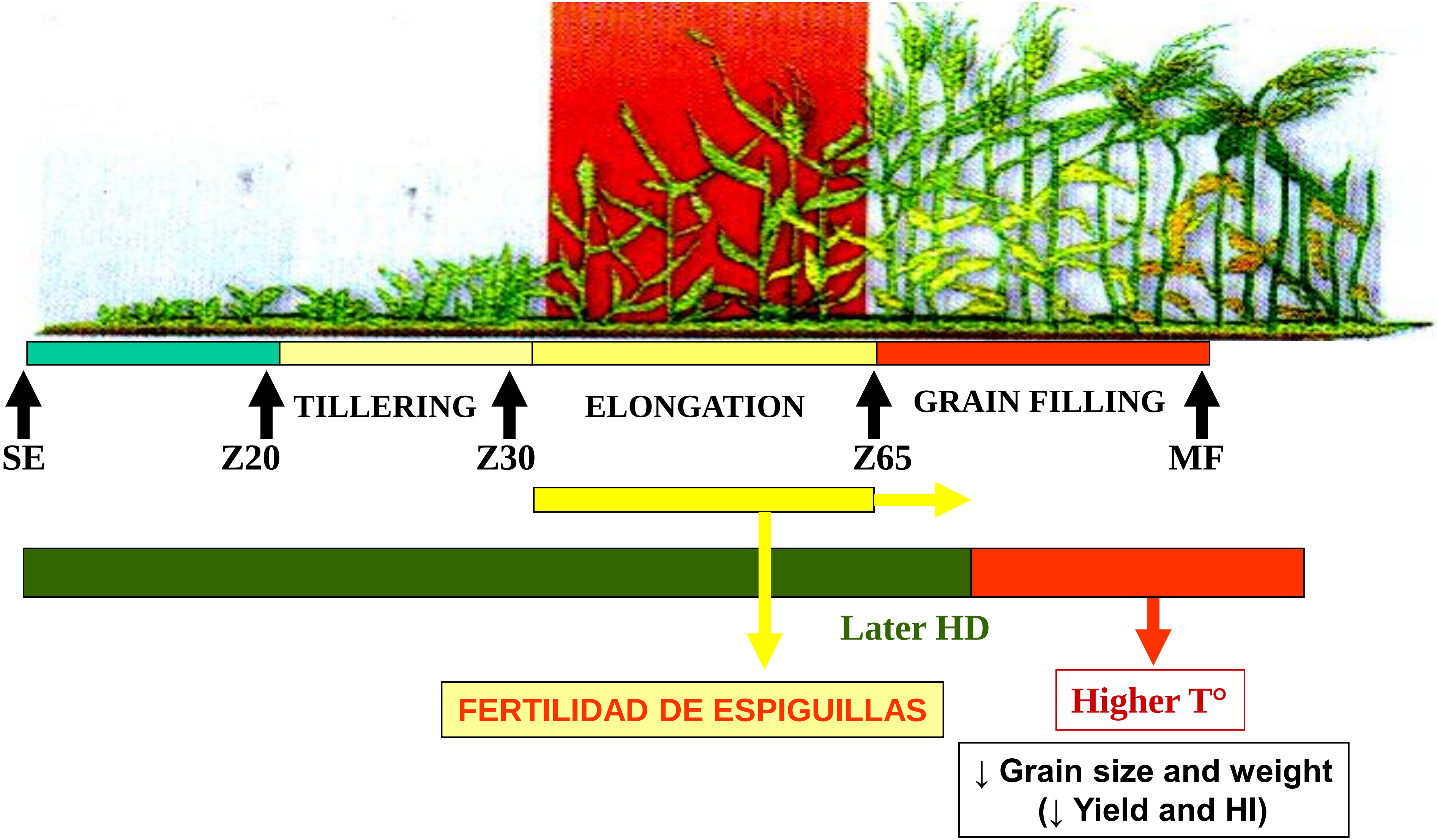

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Facultad de Agronomía. Paysandú.
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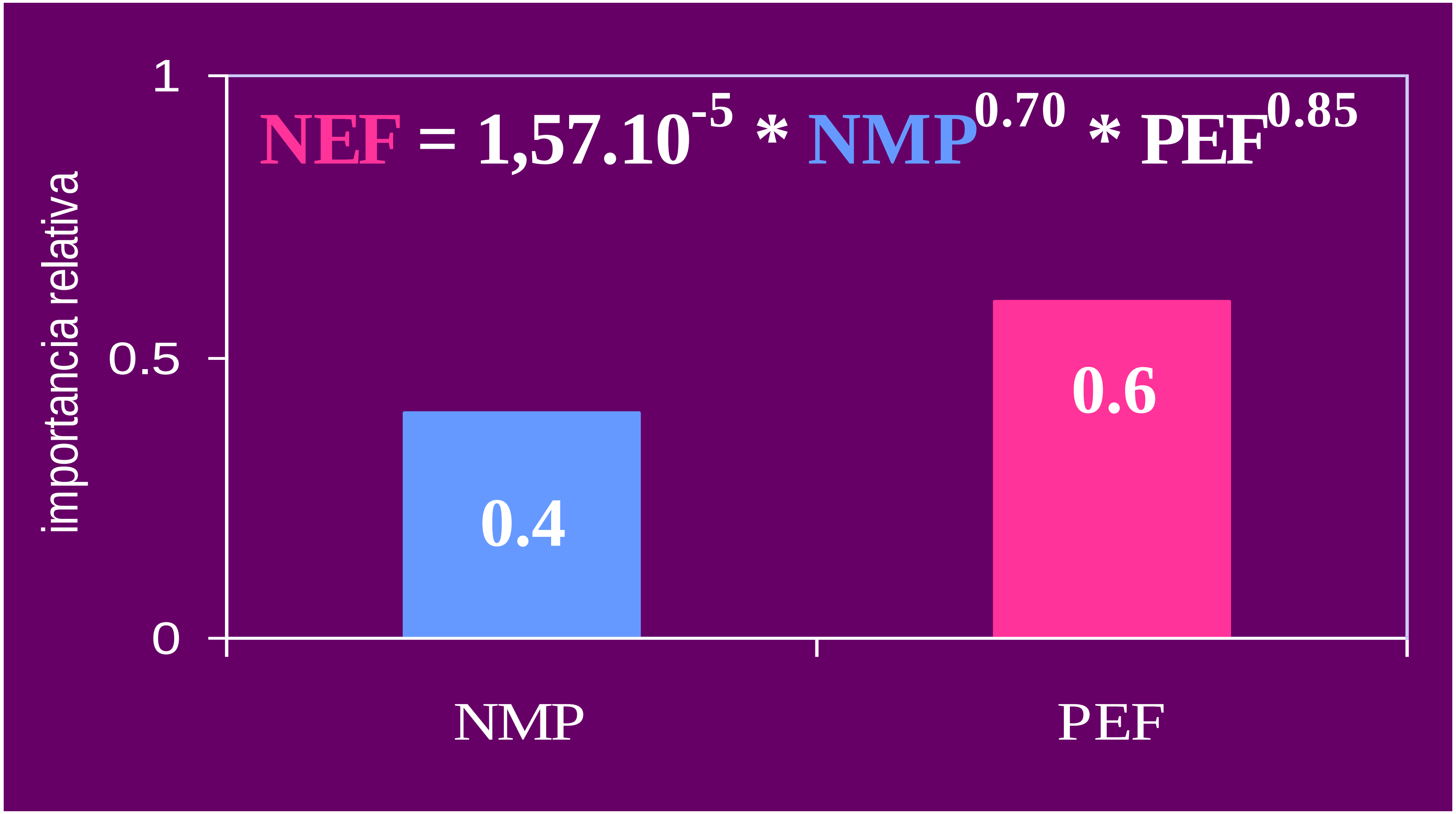
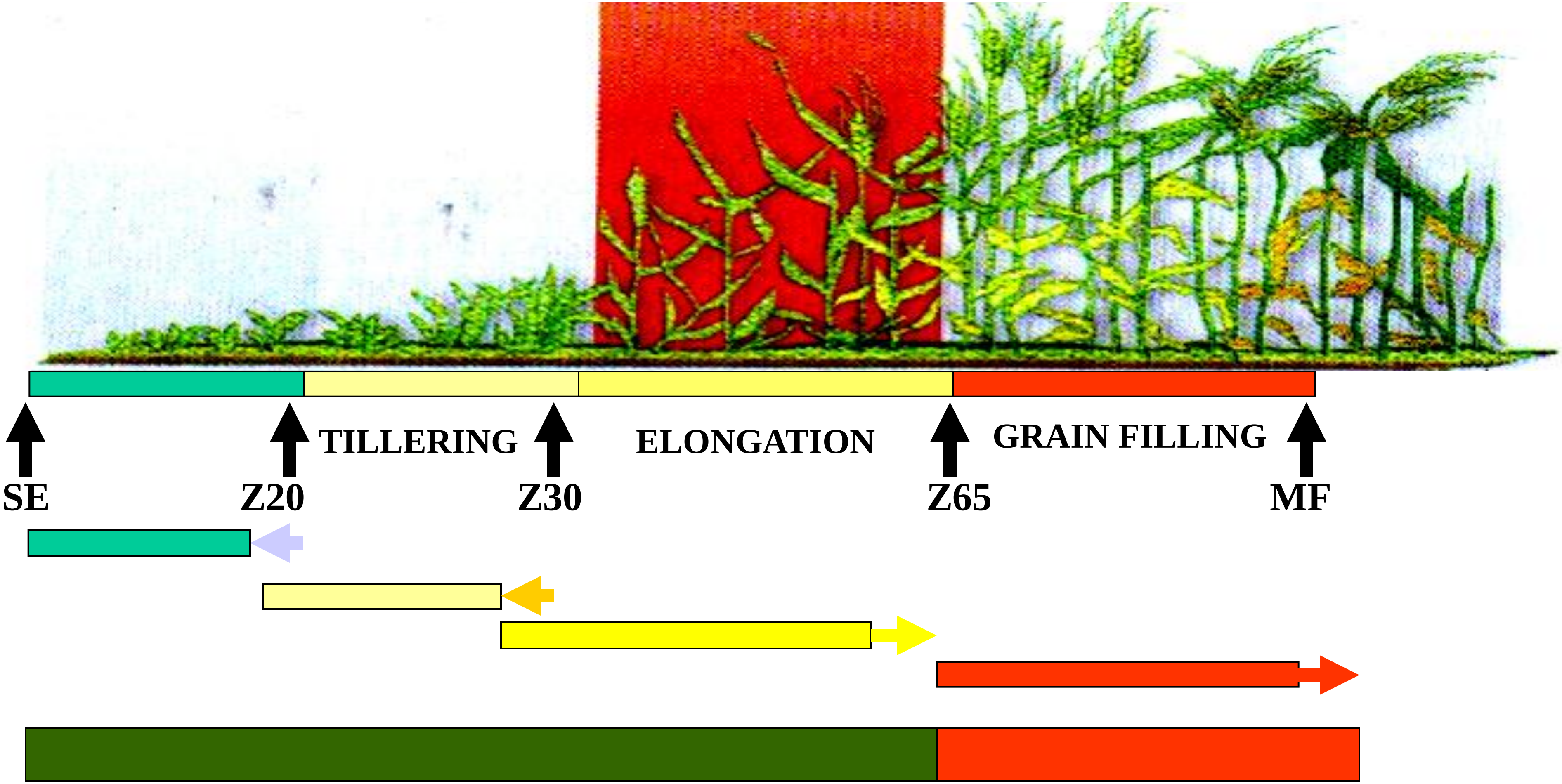
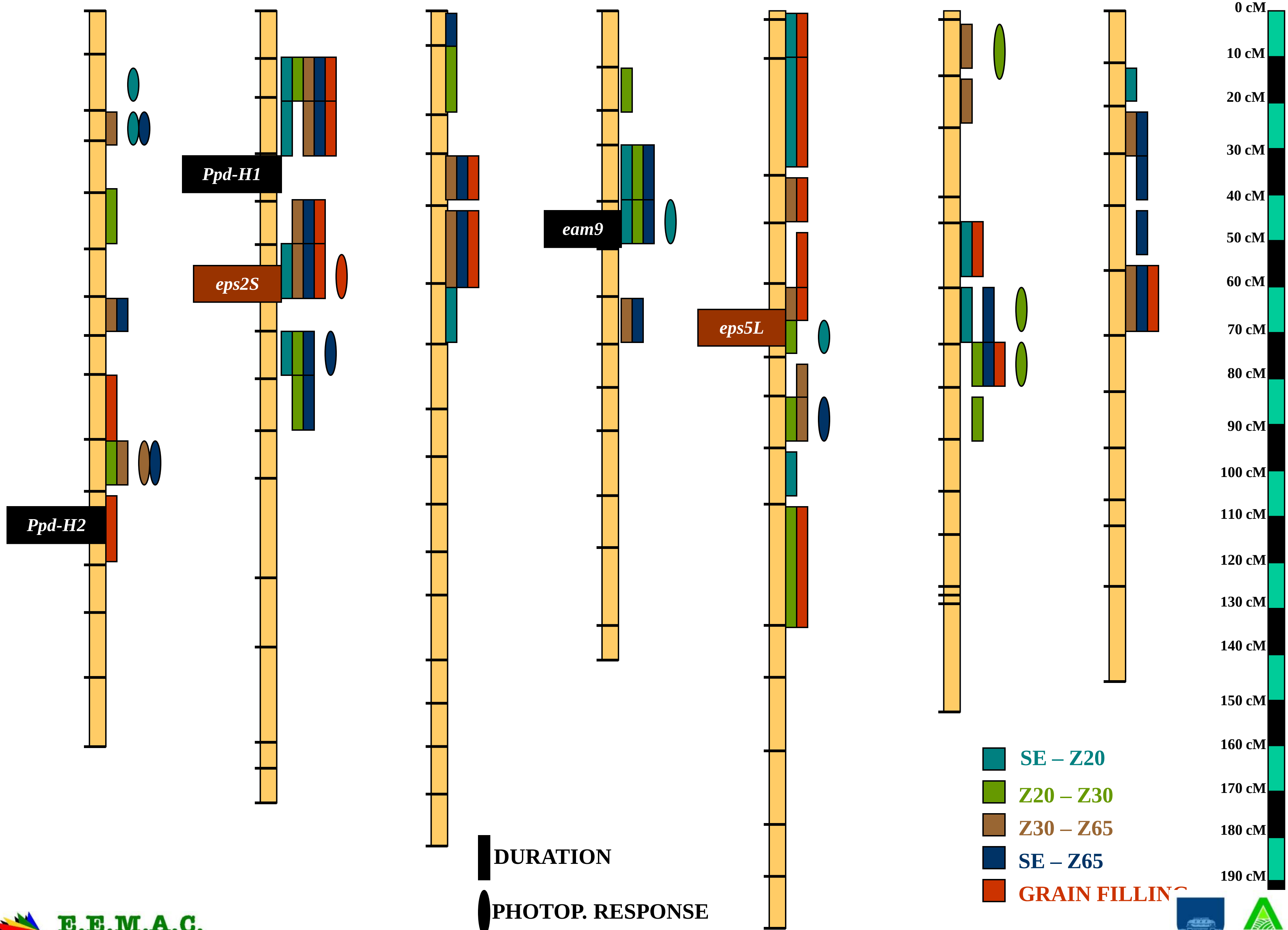
Importancia relativa en la determinación de NEF



Importancia relativa del número máximo de primordios (NMP) y el porcentaje de espiguillas fértiles (PEF), en la determinación del número de espiguillas fértiles por espiga al momento de antesis (Viega et al., 2000).



ES POSIBLE?



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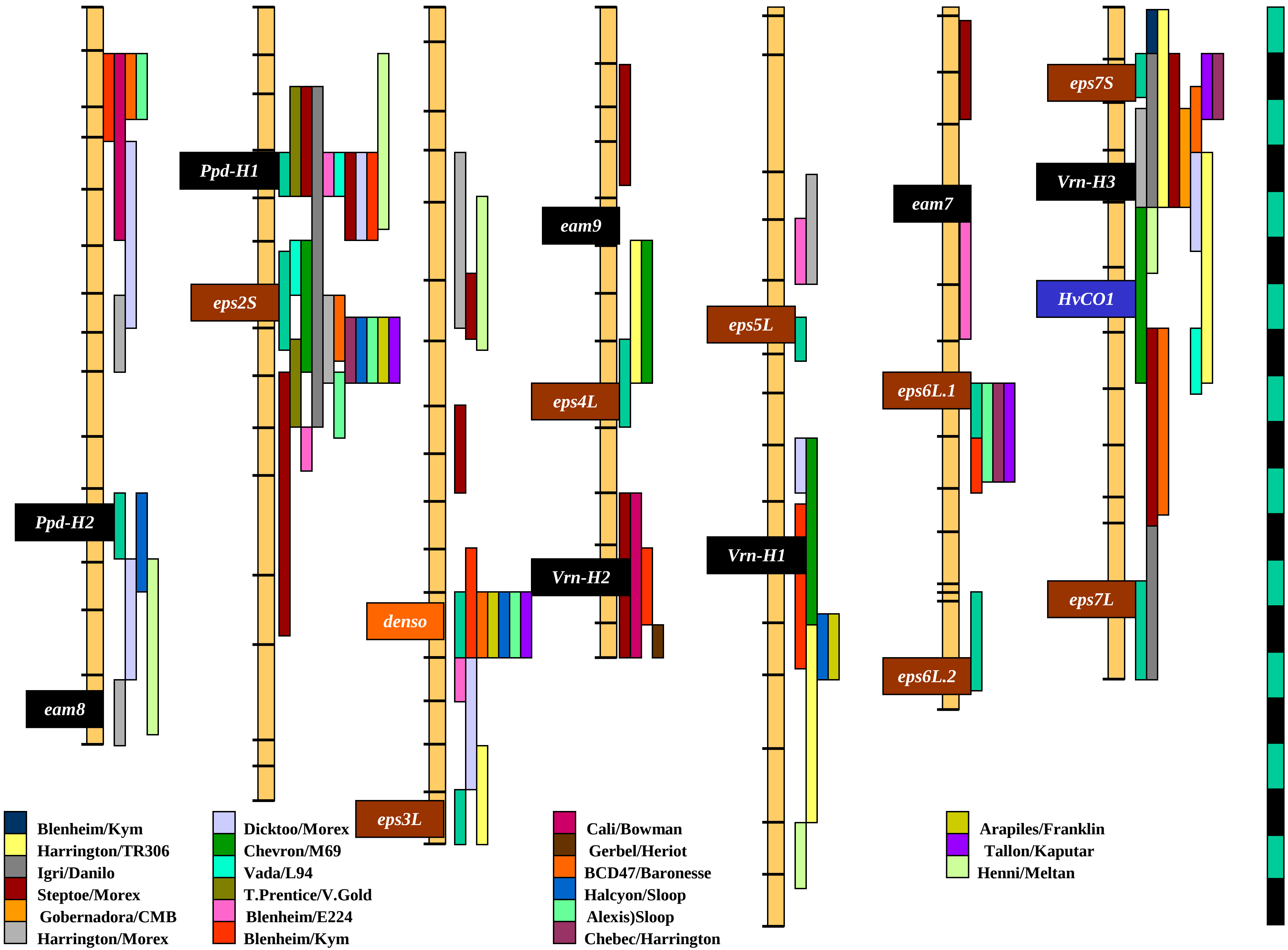
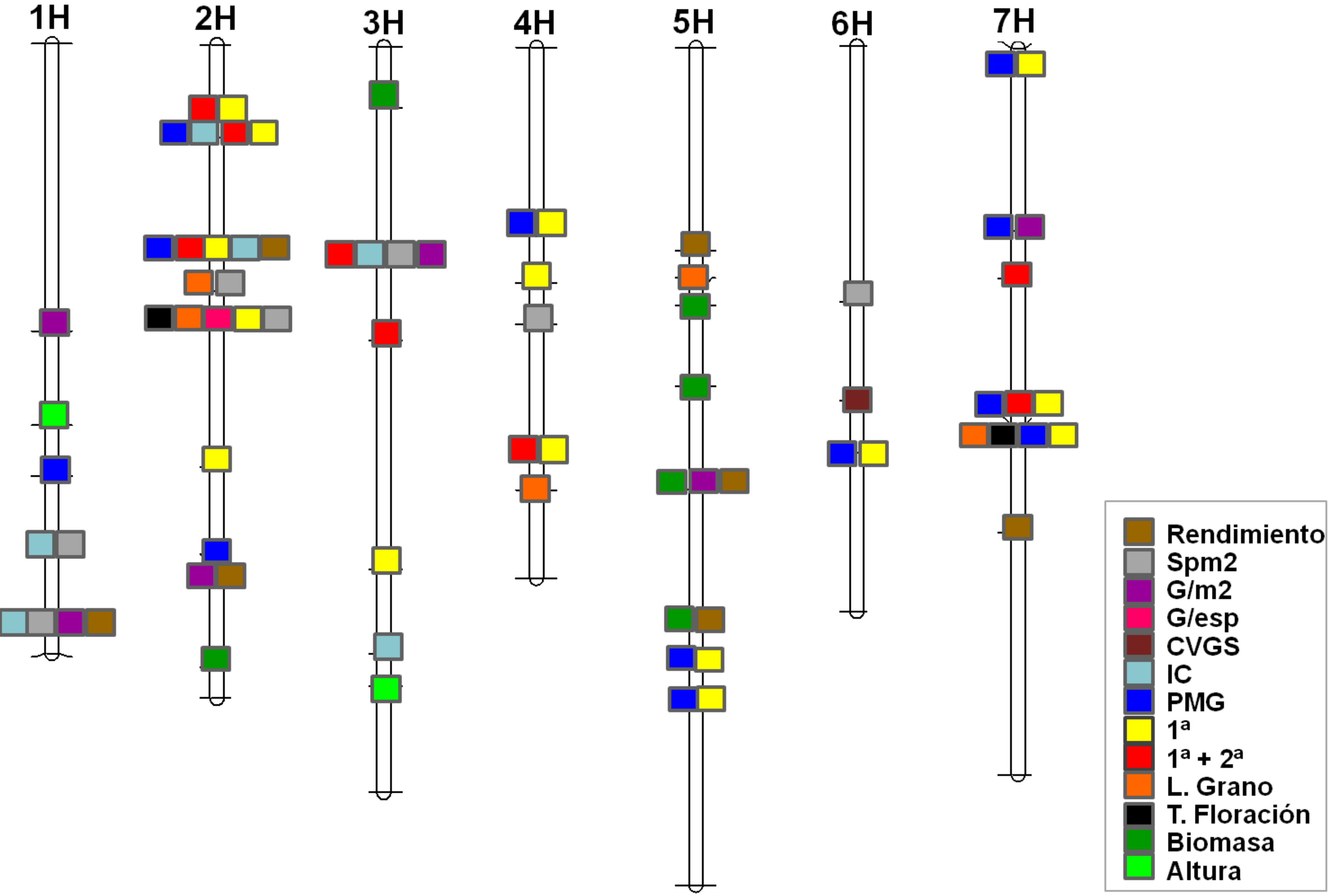
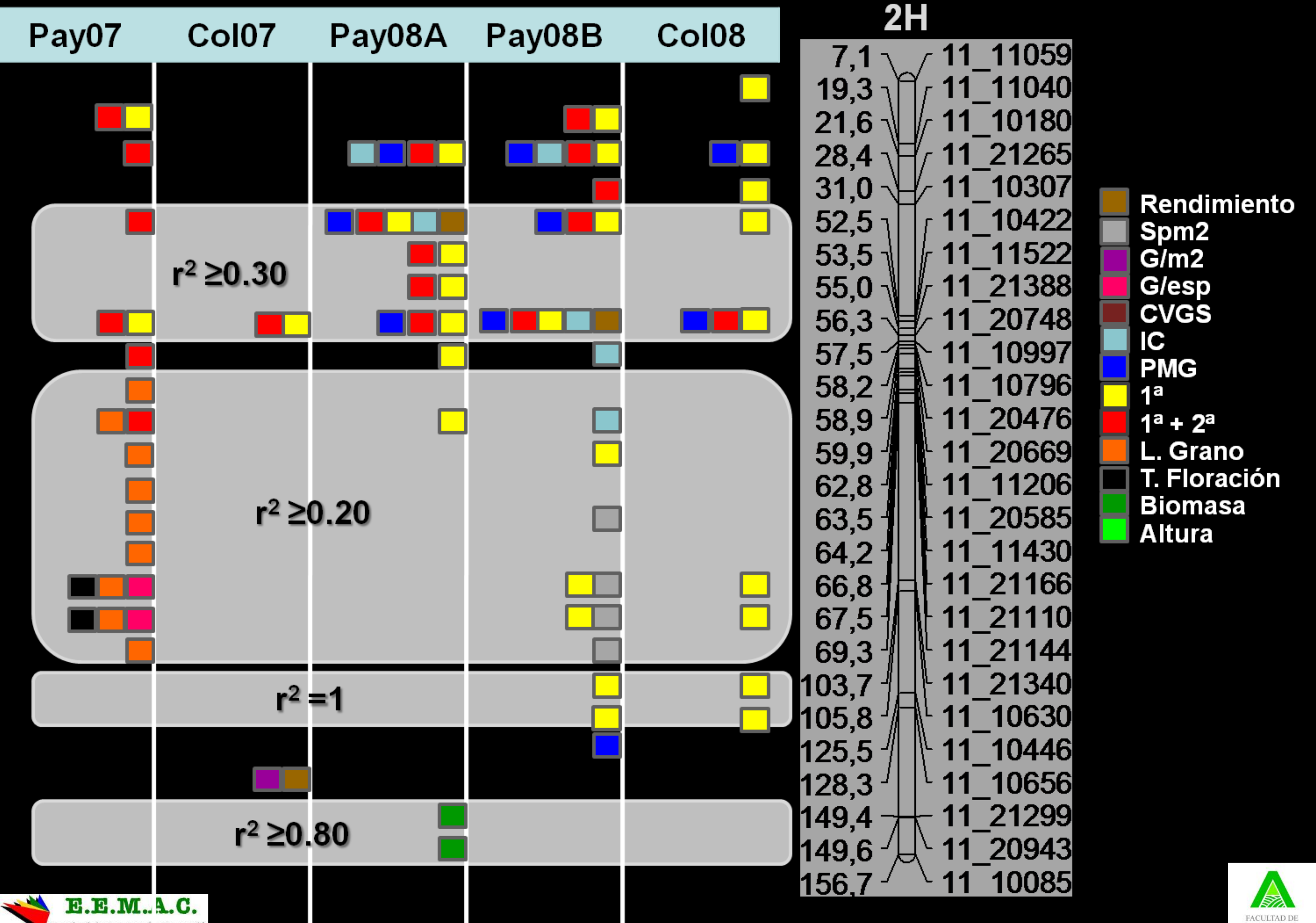

Ppd-H1
eps2S
Ppd-H2
eam8
denso
eps3L
eam9
eps4L
Vrn-H2
eps5L
Vrn-H1
eam7
eps6L.1
eps6L.2
eps7S
Vrn-H3
HvCO1
eps7L
Blenheim/Kym
Harrington/TR306
Igri/Danilo
Steptoe/Morex
Gobernadora/CMB
Harrington/Morex
Dicktoo/Morex
Chevron/M69
Vada/L94
T.Prentice/V.Gold
Blenheim/E224
Blenheim/Kym
Cali/Bowman
Gerbel/Heriot
BCD47/Baronesse
Halcyon/Sloop
Alexis)Sloop
Chebec/Harrington
Arapiles/Franklin
Tallon/Kaputar
Henni/Meltan


1H
2H
3H
4H
5H
6H
7H
Rendimiento
Spm2
G/m2
G/esp
CVGS
IC
PMG
1ª
1ª + 2ª
L. Grano
T. Floración
Biomasa
Altura



E.E.M.A.C.
Facultad de Agronomía. Paysandú.
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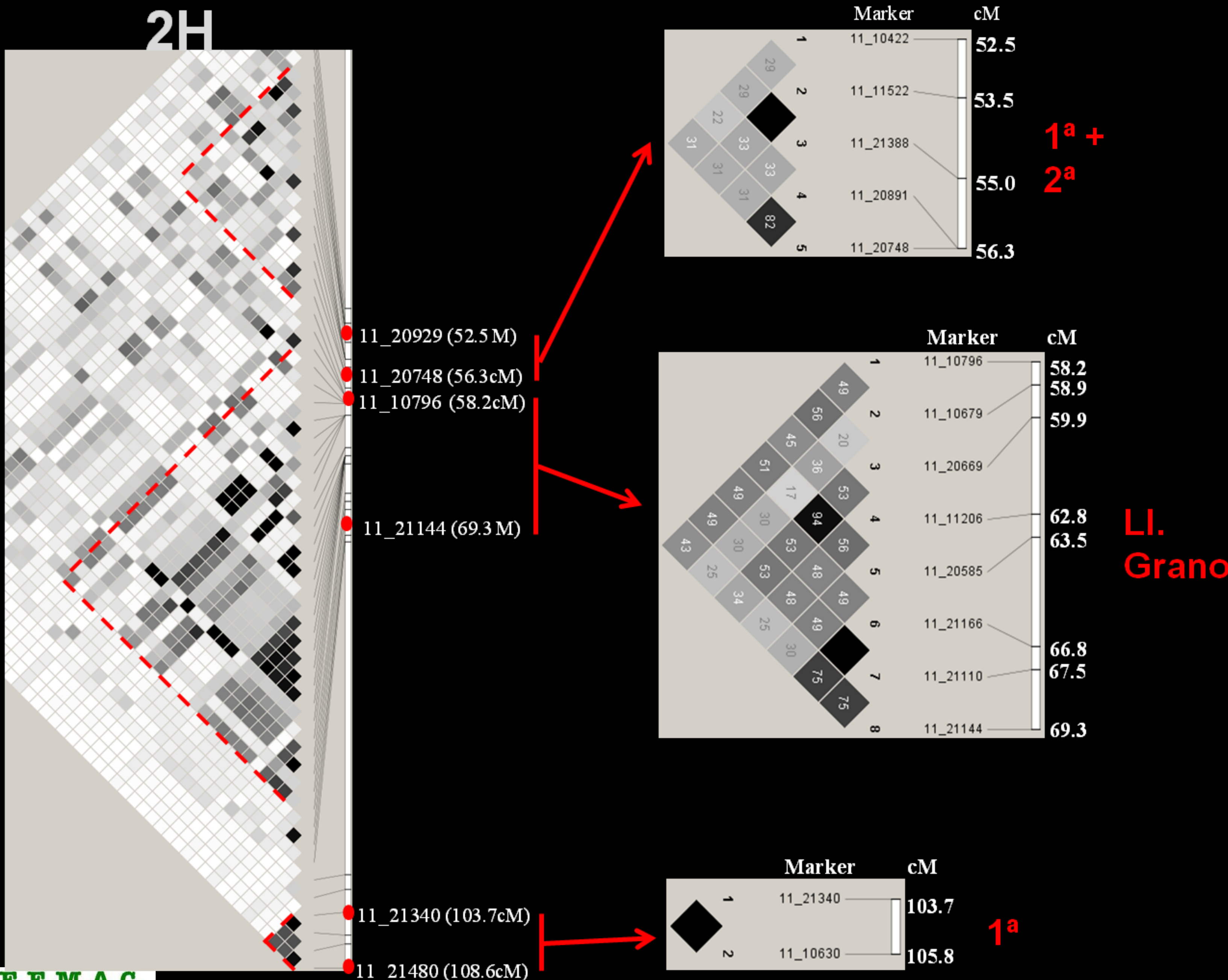

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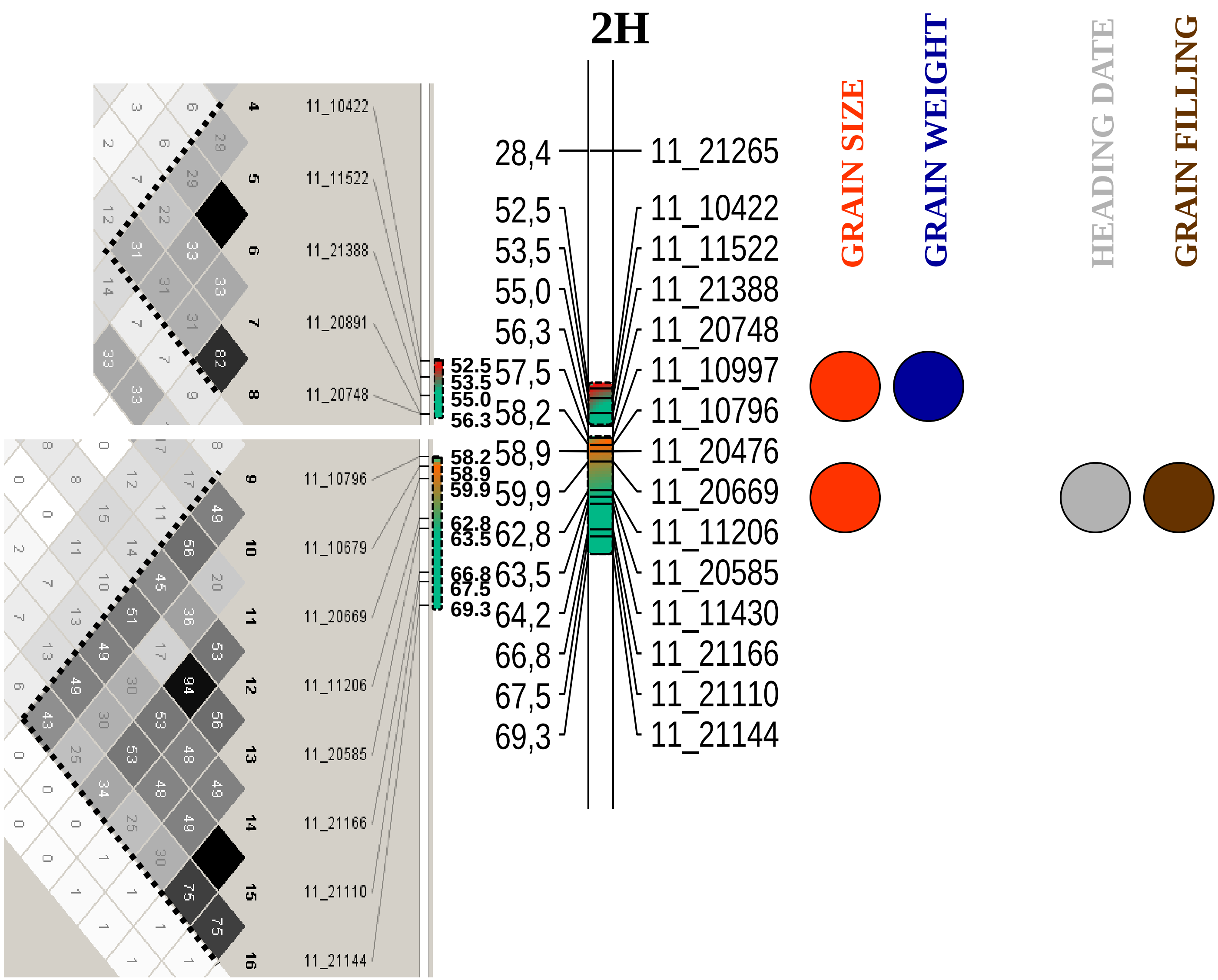
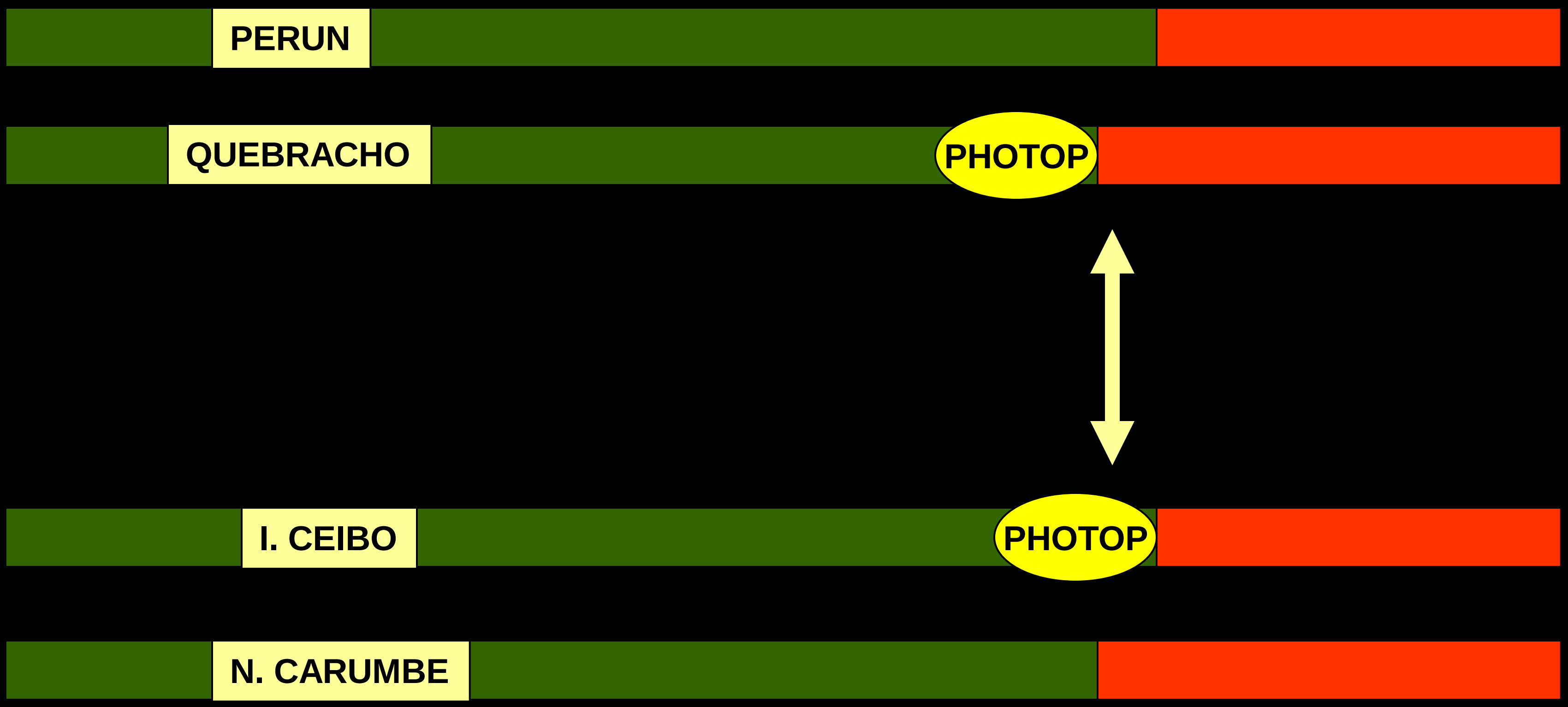
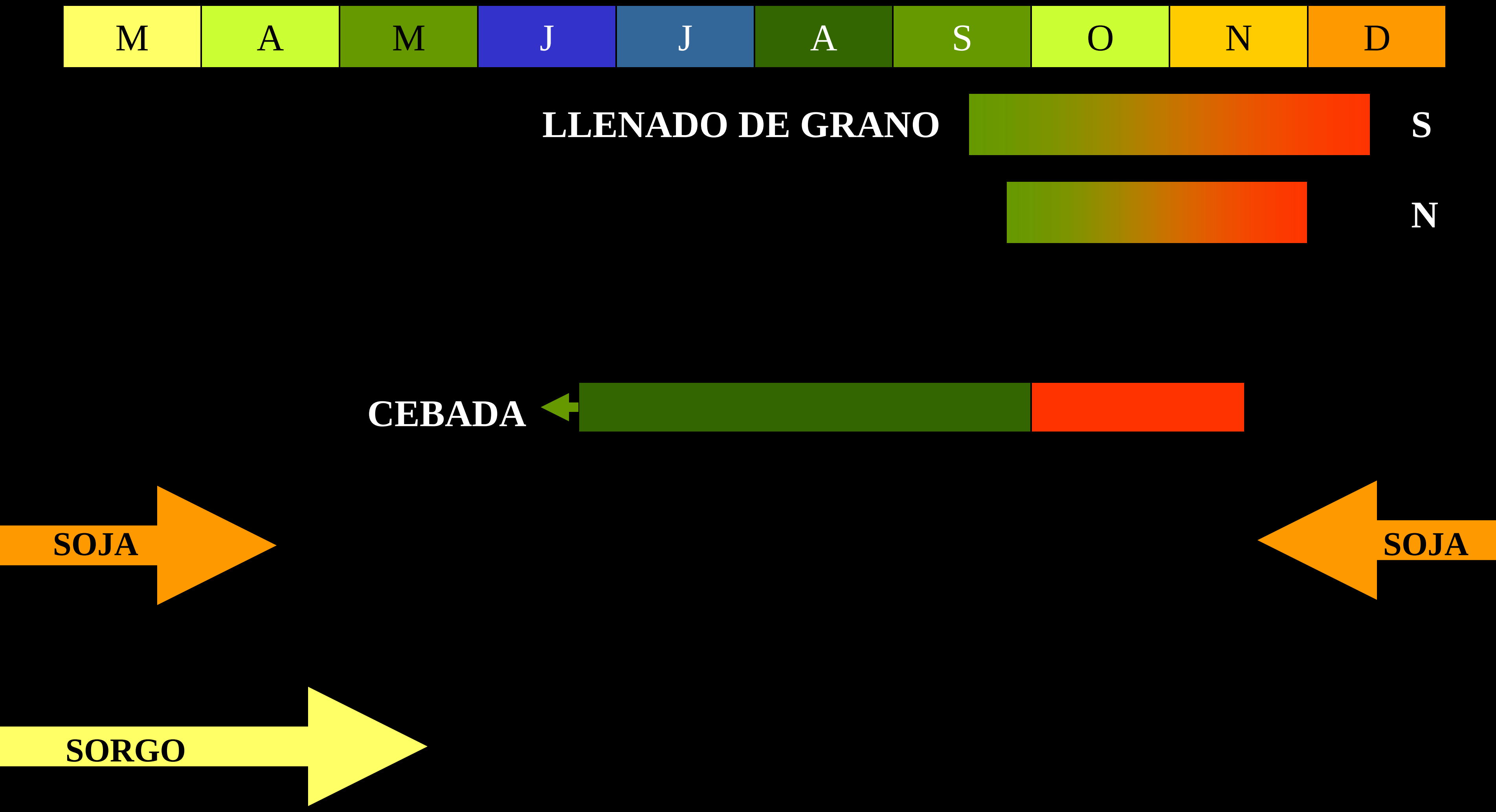

2H
28,4 11_21265
52,5 11_10422
53,5 11_11522
55,0 11_21388
56,3 11_20748
57,5 11_10997
58,2 11_10796
58,9 11_20476
59,9 11_20669
62,8 11_11206
63,5 11_20585
64,2 11_11430
66,8 11_21166
67,5 11_21110
69,3 11_21144
GRAIN SIZE
GRAIN WEIGHT
HEADING DATE
GRAIN FILLING
11_10422
11_11522
11_21388
11_20891
11_20748
11_10796
11_10679
11_20669
11_11206
11_20585
11_21166
11_21110
11_21144
52.5
53.5
55.0
56.3
58.2
58.9
59.9
62.8
63.5
66.8
67.5
69.3

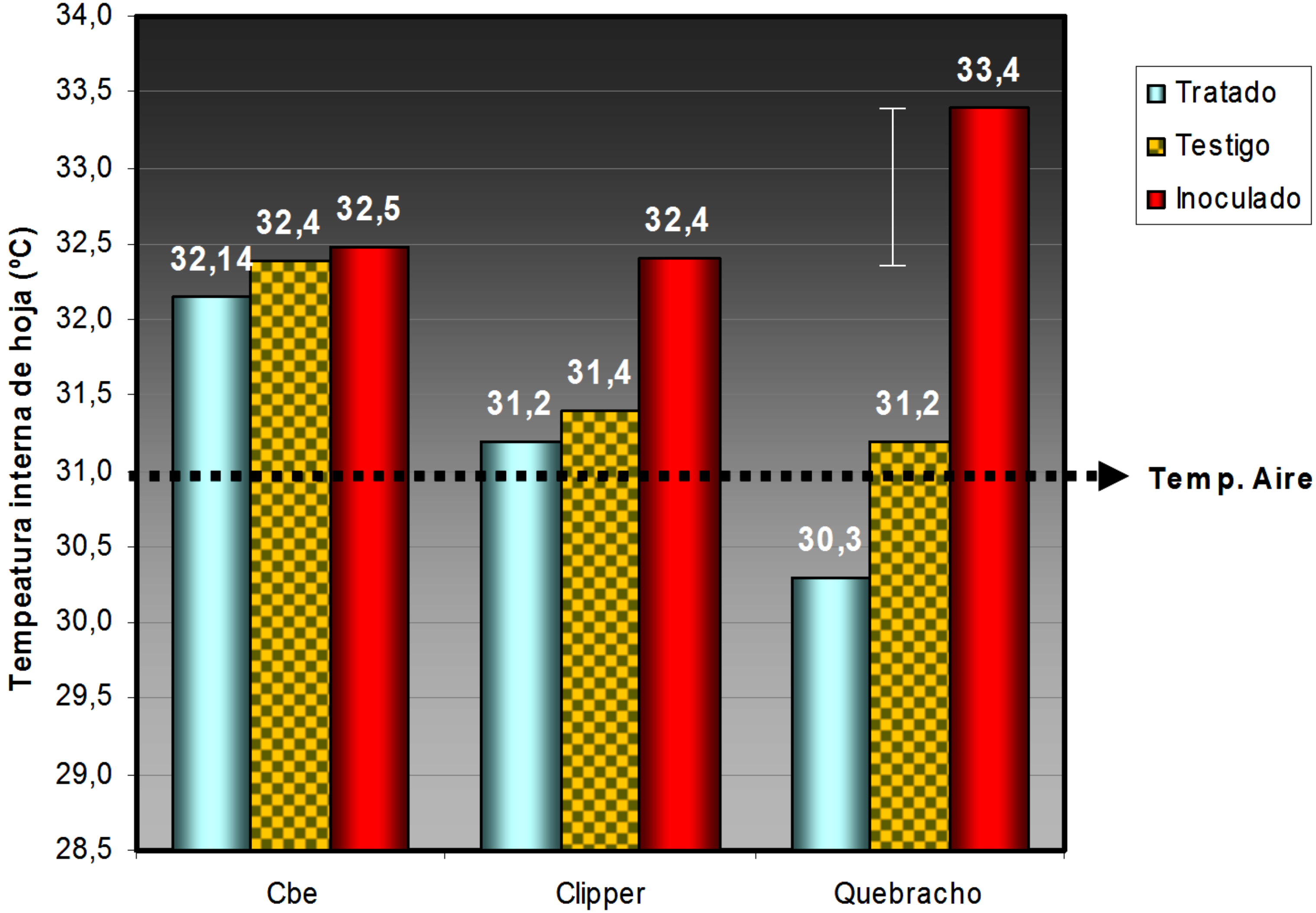
Haplotipos

		Marker	11_10796	11_20476	11_10679	11_20039	11_10317	11_11178	11_20669	11_20251	11_20032	11_11206	11_10436	11_20390	11_20532	11_20887	11_10909	11_20585	11_10191	11_10692	11_21399	11_20438	11_10685	11_10632	11_11430	11_21166	11_21110	11_10651	11_21144
		Position (cM)	58.2	58.9	58.9	58.9	59.9	59.9	59,9	59,9	59,9	62.8	62.8	63.5	63.5	63.5	63.5	63.5	63.5	63.5	63.5	63.5	63.5	63.5	64.2	66.8	67.5	68.2	69.5
	Group 1	BARONESSE	B	A		B	A	A	B	B	B	A	B	A	A	A	B	A	A	B	B	B	B	B	A	B	A	B	B
		C8730	B	A	B	B	A	A	B	B	B	A	B	A	A	A	B	A	A	B	B	B	B	B	A	B	A	B	B
		C9035	B	A	B	B	A	A	B	B	B	A	B	A	A	A	B	A	A	B	B	B	B	B	A	B	A	B	B
		C9172	B	A	B	B	A	A	B	B	B	A	B	A	A	A	B	A	A	B	B	B	B	B	A	B	A	A	B
		C9173	B	A	B	B	A	A	B	B	B	A	B	A	A	A	B	A	A	B	B	B	B	B	A	B	A	A	B
		CLE233	B	A	B	B	A	A	B	B	B	A	B	A	A	A	B	A	A	B	B	B	B	B	A	B	A	B	B
		CHERI	B	A	B	B	A	A	B	B	B	A	B	A	A	A	A	A	A	B	B	B	B	B	A	B	A	B	B
		CLIVIA	B	A	B	B	A	A	B	B	B	A	B	A	A	A	B	A	A	B	B	B	B	B	A	B	A	B	B
		DANUTA	B	A	B	B	A	A	B	B	B	A	B	A	A	A	B	A	A	B	B	B	B	B	A	B	A	B	B
		DEFRA	B	A	B	B	A	A	B	B	B	A	B	A	A	A	B	A	A	B	B	B	B	B	A	B	A	B	B
		DIAMANT	B	A	B	B	A	A	B	B	B	A	B	A	A	A	A	A	A	B	B	B	B	B	A	B	A	B	B
22		GULL	B	A	B	B	A	A	B	B	B	A	B	A	A	A	B	A	A	B	B	B	B	B	A	B	A	B	B
		ISARIA	B	A	B	B	A	A	B	B	B	A	B	A	A	A	B	A	A	B	B	B	B	B	A	B	A	B	B
		KARL	B	A	B	B	A	A	B	B	B	A	B	A	A	A	A	A	A	B	B	B	B	B	A	B	A	B	B
		LISA	B	A	B	B	A	A	B	B	B	A	B	A	A	A	B	A	A	B	B	B	B	B	A	B	A	B	B
		PERUN	B	A	B	B	A	A	B	B	B	A	B	A	A	A	A	A	A	B	B	B	B	B	A	B	A	B	B
		Q. AYELEN	B	A	B	B	A	A	B	B	B	A	B	A	A	A	A	A	A	B	B	B	B	B	A	B	A	B	B
		SCARLETT	B	A	B	B	A	A	B	B	B	A	B	A	A	A	B	A	A	B	B	B	B	B	A	B	A	B	B
		TRUMPF	B	A	B	B	A	A	B	B	B	A	B	A	A	A	B	A	A	B	B	B	B	B	A	B	A	B	B
		UNION	B	A	B	B	A	A	B	B	B	A	B	A	A	A	A	A	A	B	B	B	B	B	A	B	A	B	B
		VILLA	B	A	B	B	A	A	B	B	B	A	B	A	A	A	B	A	A	B	B	B	B	B	A	B	A	B	B
		VOLLA	B	A	B	B	A	A	B	B	B	A	B	A	A	A	B	A	A	B	B	B	B	B	A	B	A	B	B
	Group 2	ANA	A	A	A	B	A	A	A	A	B	B	A	A	A	A	A	B	B	A	A	A	A	B	B	A	B	A	A
		C8806	A	A	A	B	A	A	A	A	B	B	A	A	A	A	A	B	B	A	A	A	A	B	B	A	B	A	A
		C8828	A	A	A	B	A	A	A	A	B	B	A	A	A	A	A	B	B	A	A	A	A	B	B	A	B	A	A
		C9038	A	A	A	B	A	A	A	A	B	B	A	A	A	A	A	B	B	A	A	A	A	B	B	A	B	A	A
		C9205	A	A	A	B	A	A	A	A	B	B	A	A	A	A	A	B	B	A	A	A	A	B	B	A	B	A	A
		CLE226	A	A	A	B	A	A	A	A	B	B	A	A	A	A	A	B	B	A	A	A	A	B	B	A	B	A	A
		CLIPPER	A	A	A	B	A	A	A	A	B	B	A	A	A	A	A	B	B	A	A	A	A	B	B	A	B	A	A
13		FNCI22	A	A	A	B	A	A	A	A	B	B	A	A	A	A	A	B	B	A	A	A	A	B	B	A	B	A	A
		MAGNIFIC104	A	A	A	B	A	A	A	A	B	B	A	A	A	A	A	B	B	A	A	A	A	B	B	A	B	A	A
		PRIOR	A	A	A	B	A	A	A	A	B	B	A	A	A	A	A	B	B	A	A	A	A	B	B	A	B	A	A
		Q. PAMPA	A	A	A	B	A	A	A	A	B	B	A	A	A	A	A	B	B	A	A	A	A	B	B	A	B	A	A
		QUEBRACHO	A	A	A	B	A	A	A	A	B	B	A	A	A	A	A	B	B	A	A	A	A	B	B	A	B	A	A
		STIRLING	A	A	A	B	A	A	A	A	B	B	A	A	A	A	A	B	B	A	A	A	A	B	B	A	B	A	A
	Group 3	AURORE	B	B	B	B	A	A	B	B	B	A	B	A	A	A	A	A	A	B	B	B	B	B	A	B	A	A	B
		BEKA	B	B	B	B	A	A	B	B	B	A	B	A	A	A	A	A	A	B	B	B	B	B	A	B	A	A	B
		BONITA	B	B	B	B	A	A	B	B	B	A	B	A	A	A	A	A	A	B	B	B	B	B	A	B	A	A	B
		HAISA	B	B	B	B	A	A	B	B	B	A	B	A	A	A	A	A	A	B	B	B	B	B	A	B	A	A	B
10		HANNA	B	B	B	B	A	A	B	B	B	A	B	A	A	A	A	A	A	B	B	B	B	B	A	B	A	B	B
		HARRINGTON	B	B	B	B	A	A	B	B	B	A	B	A	A	A	A	A	A	B	B	B	B	B	A	B	A	A	B
		KENIA	B	B	B	B	A	A	B	B	B	A	B	A	A	A	A	A	A	B	B	B	B	B	A	B	A	A	B
		PIROLINE	B	B	B	B	A	A	B	B	B	A	B	A	A	A	A	A	A	B	B	B	B	B	A	B	A	A	B
		WMRI	B	B	B	B	A	A	B	B	B	A	B	A	A	A	A	A	A	B	B	B	B	B	A	B	A	A	B
		YMER	B	B	B	B	A	A	B	B	B	A	B	A	A	A	A	A	A	B	B	B	B	B	A	B	A	A	B


PERUN
QUEBRACHO
PHOTOP
I. CEIBO
PHOTOP
N. CARUMBE


M A M J J A S O N D
LLENADO DE GRANO
S
N
CEBADA
SOJA
SOJA
SORGO

Temperatura interna de la hoja para todos los tratamientos evaluados en los tres cultivares, en el campo. Año 2005.



E.E.M.A.C.
Facultad de Agronomía. Paysandú.
Universidad de la República.

FACULTAD DE AGRONOMIA
UNIVERSIDAD DE LA REPUBLICA




09/14/2005

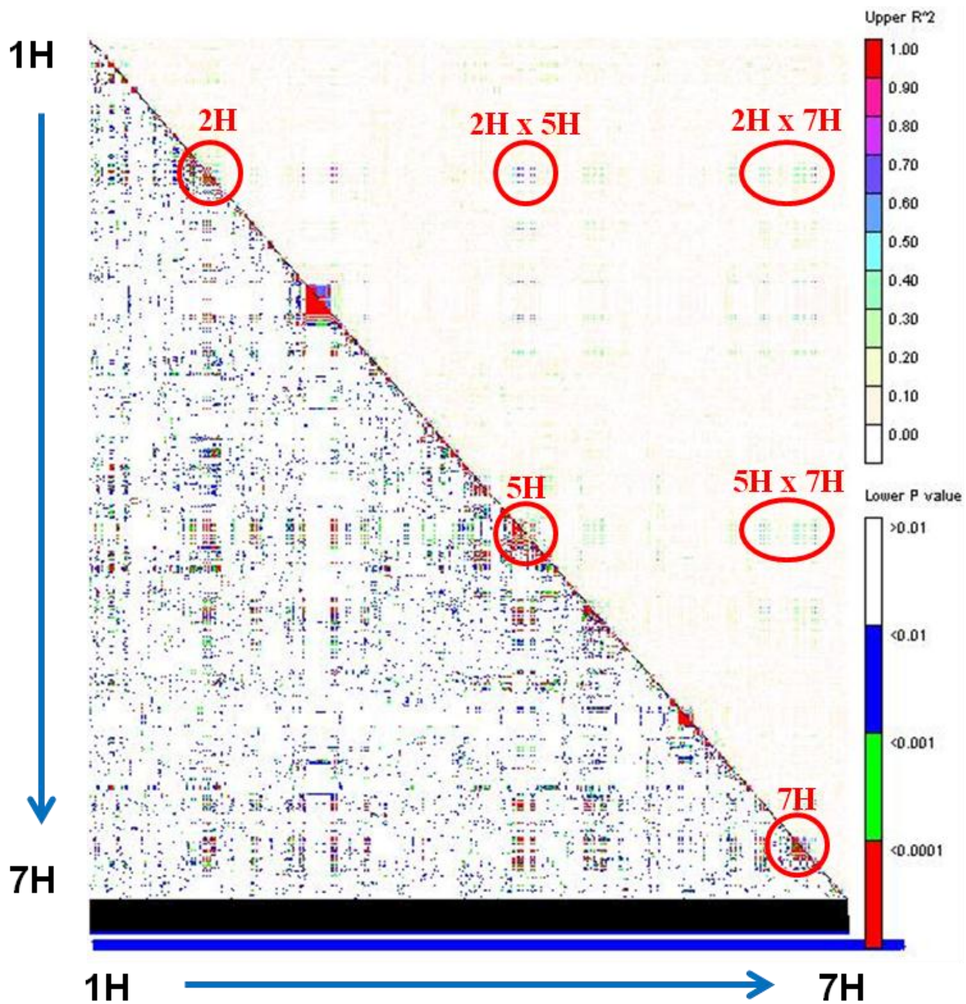


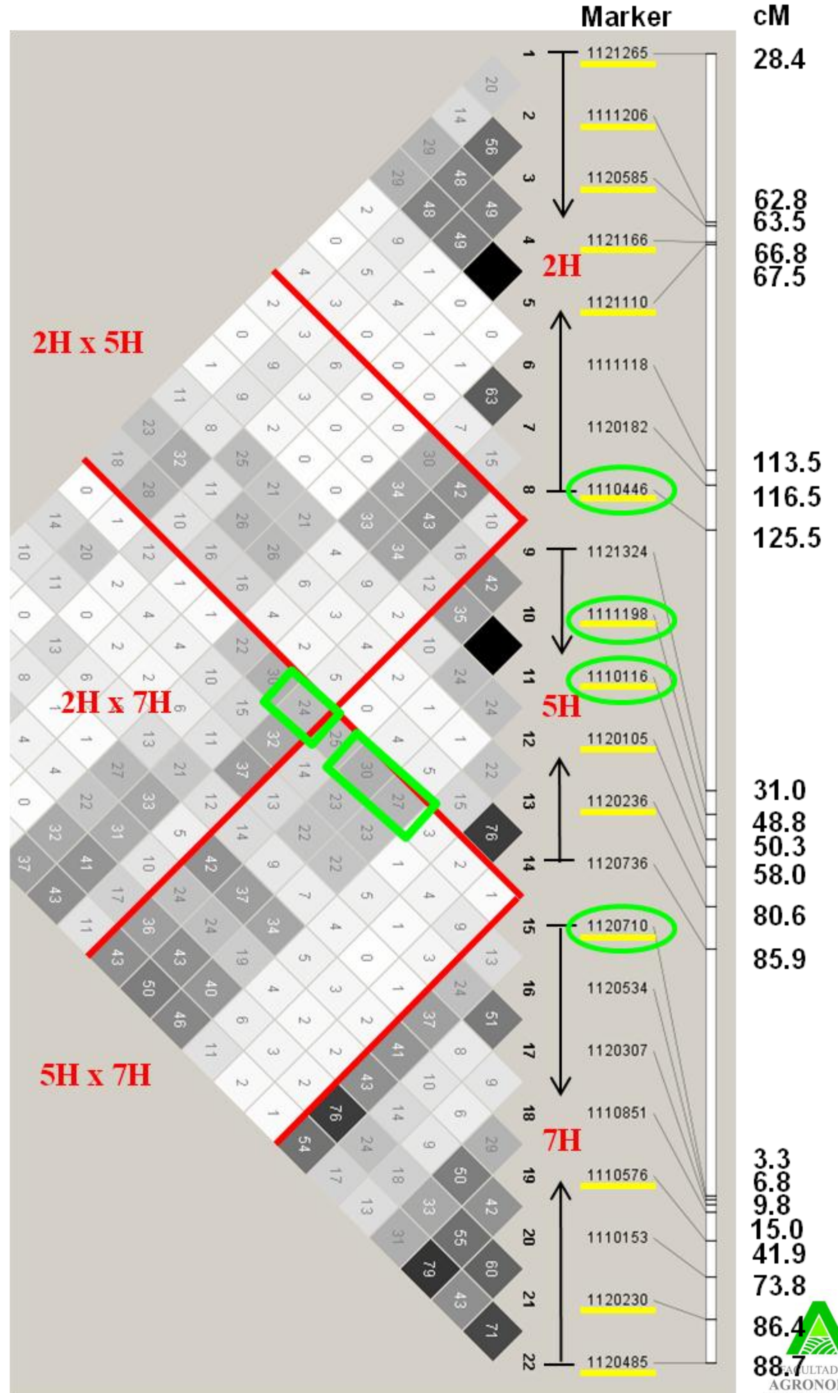


Dr. EDUARDO ACEVEDO


CEBADA CLE 202
CEIBO

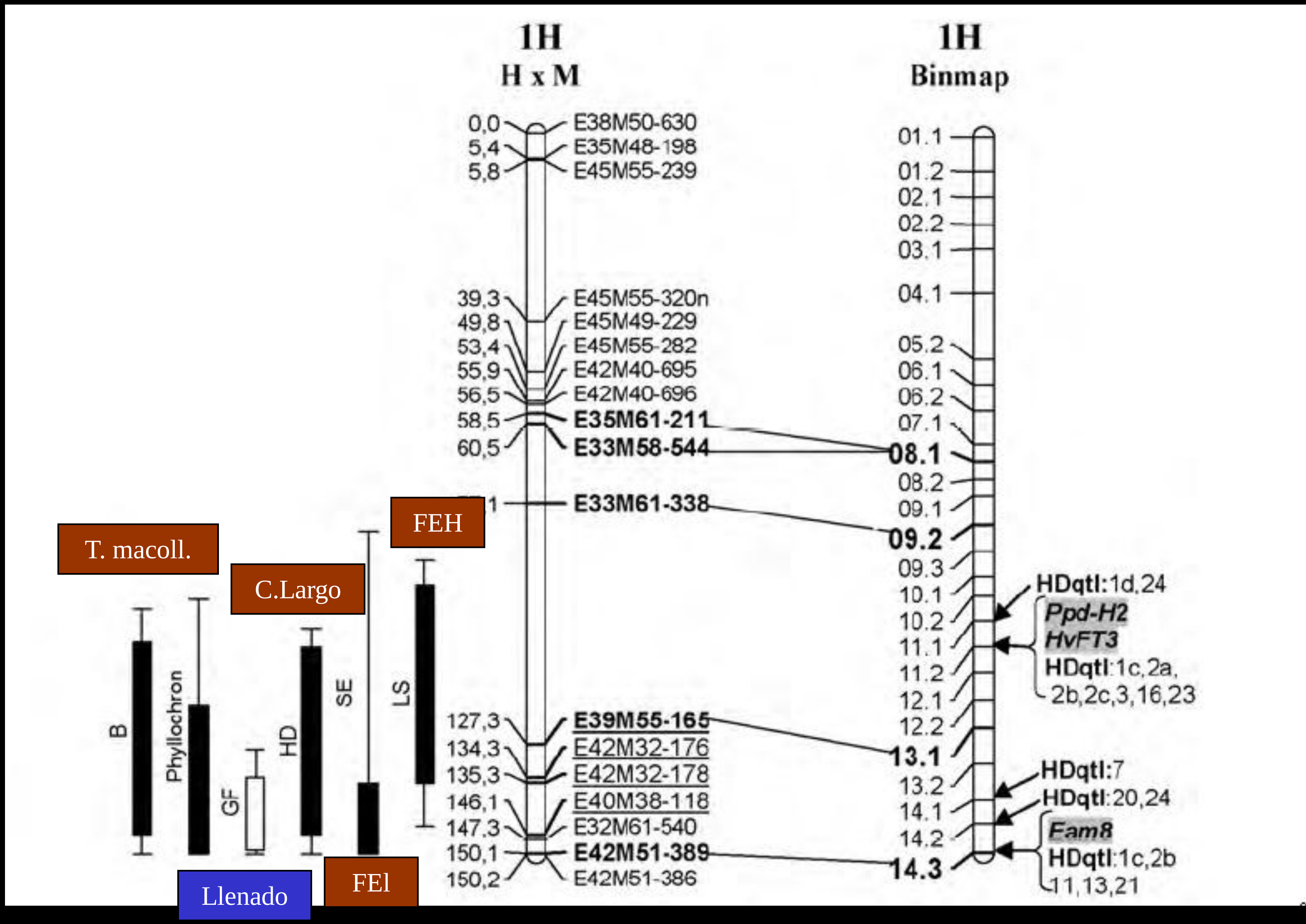

Asociación entre cromosomas





Genotipo	País de Origen	Año	Tipo de material
Baronesse	Alemania	1989	CULT
Bido	Alemania	1960	CULT
Cheri	Alemania	1987	CULT
Clivia	Alemania	1985	CULT
Danuta	Alemania	2000	CULT
Haisa	Alemania	1939	CULT
Isaria	Alemania	1924	CULT
Lisa	Alemania	1969	CULT
Scarlett	Alemania	1995	CULT
Trumpf	Alemania	1973	CULT
Union	Alemania	1955	CULT
Villa	Alemania	1965	CULT
Volla	Alemania	1957	CULT
Ana	Argentina	1978	CULT
Bonita	Argentina	1973	CULT
Magnific 102	Argentina	_	CULT
Magnific 104	Argentina	_	CULT
Malt. Heda	Argentina	1943	CULT
Q. Pampa	Argentina	1982	CULT
Clipper	Australia	1968	CULT
Prior	Australia	1903	CULT
Quebracho	Australia	1990	CULT
Mn 610	Brasil	1990	EXPL
Harrington	Canada	1981	CULT

Genotipo	País de Origen	Año	Tipo de material
Kenia	Dinamarca	1931	CULT
Atlas 57	Estados Unidos	1959	CULT
Bowman	Estados Unidos	1984	CULT
Karl	Estados Unidos	1974	CULT
Logan	Estados Unidos	1994	CULT
ND 10277	Estados Unidos	1994	LEXP
Aurore	Francia	1993	CULT
Beka	Francia	1954	CULT
Pl. Archer	Reino Unido	1914	CULT
Hanna	Rep. Checa	1895	CULT
Perun	Rep. Checa	1987	CULT
Gull	Suecia	1913	CULT
Ymer	Suecia	1945	CULT
Ambev 488	Uruguay	2003	CULT
C 8730	Uruguay	1999	EXPL
C 8806	Uruguay	1999	EXPL
Carumbe	Uruguay	1998	CULT
CLE 176	Uruguay	1999	CULT
CLE 202	Uruguay	2001	CULT
CLE 203	Uruguay	2001	CULT
CLE 226	Uruguay	2005	CULT
Dayman	Uruguay	1999	CULT
FNC 1	Uruguay	1981	CULT
FNC 6-1	Uruguay	1987	CULT



E.E.M.A.C.
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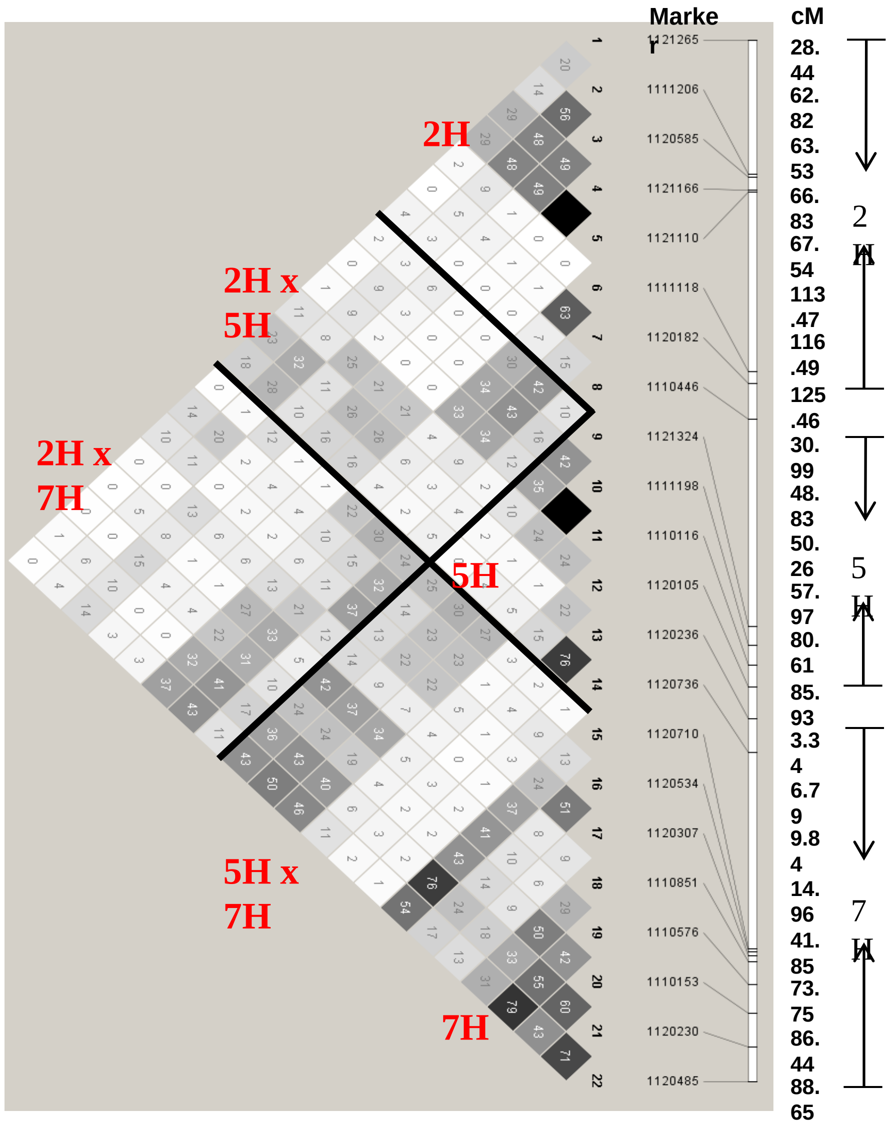

HAPLOTYPES RELATED WITH ORIGIN

QUALITY?

ADAPTATION?