PRESENTATION

Session: **Cotton Breeding, Production, Ginning**

Title: **Genetic improvement in cotton lint quality parameters in Argentina from 1965.**

Speaker: **Gonzalo Scarpin,** INTA, Reconquista, Argentina
Luise Casas, Fundación MasValor, Reconquista, Argentina

Presentations are available in the conference archive: https://baumwollboerse.de/en/competencies/international-cotton-conference/speeches/

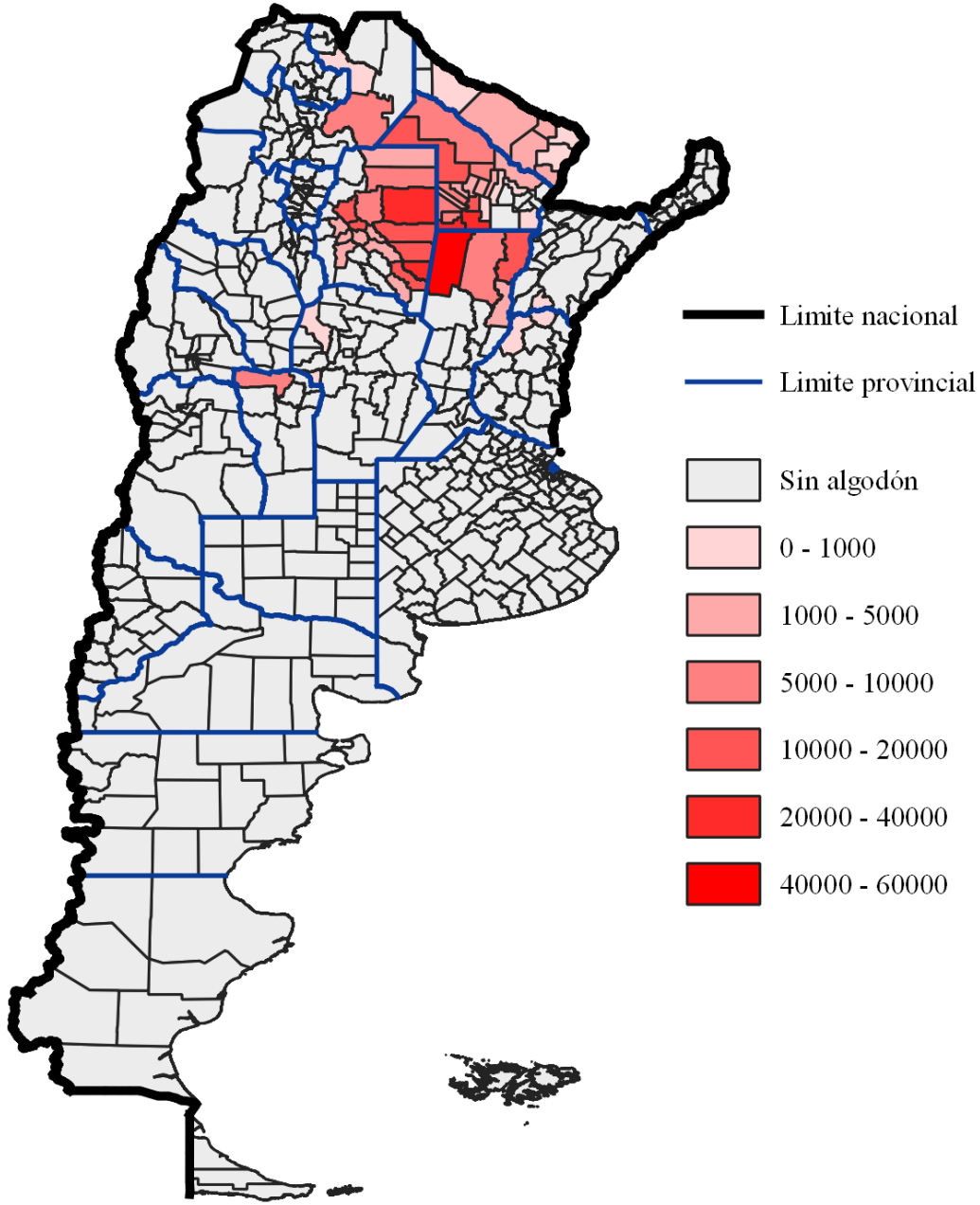
Conference Organization

Faserinstitut Bremen e.V., Bremen, Germany. E-Mail: conference@faserinstitut.de
Bremer Baumwollboerse, Bremen, Germany. E-Mail: info@baumwollboerse.de

Genetic improvement in cotton lint quality parameters in Argentina from 1965.

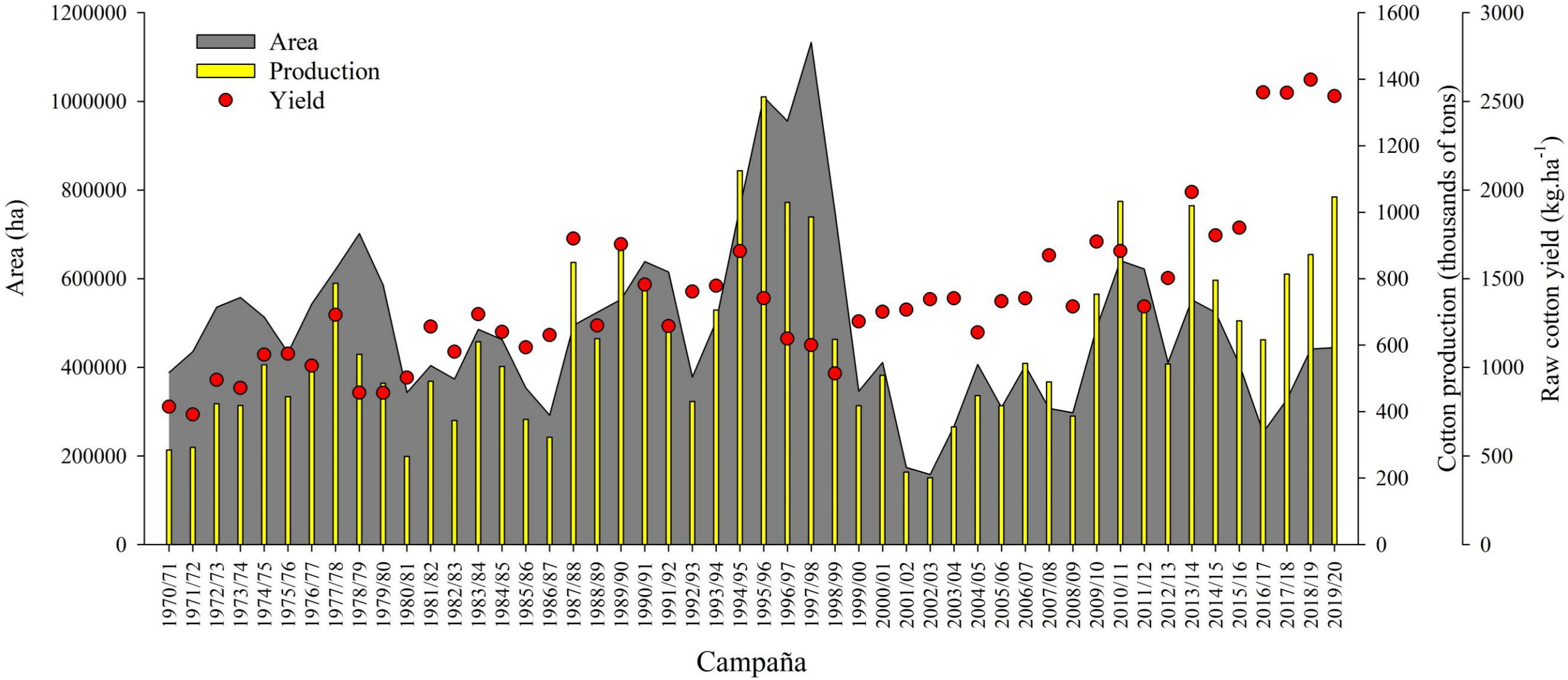
Agr. Eng. (PhD) Scarpin, Gonzalo
INTA - Argentina

Instituto Nacional de Tecnología Agropecuaria



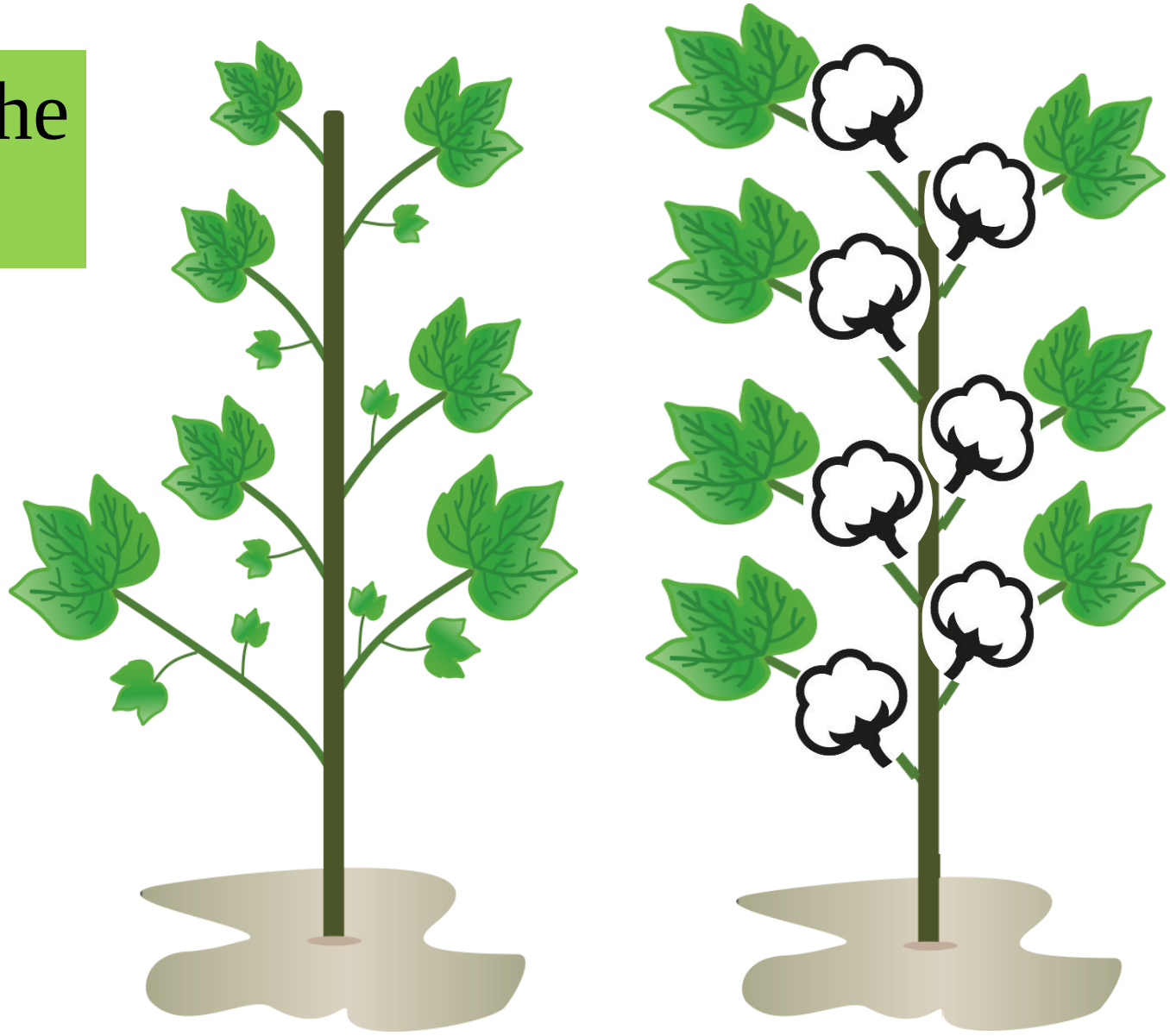
- 278.040.000 ha.
- 15% cultivable land
- 31.000.000 ha. with potential land to grow crops.
- 11.000.000 ha. with potential land and climate conditions to grow cotton
- Only once reach 1.13 million ha. (1997-98)
- 2 growing cotton systems: rainfed (90%) and irrigated (10%)

Evolution of cotton area, production and yield in Argentina from 1970

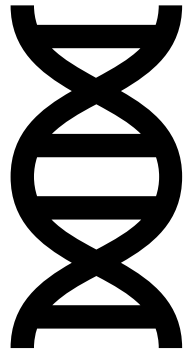


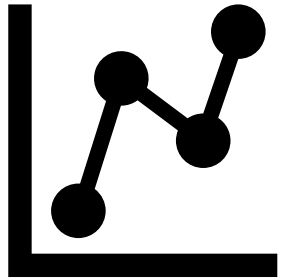
Special characteristics of the cotton crop

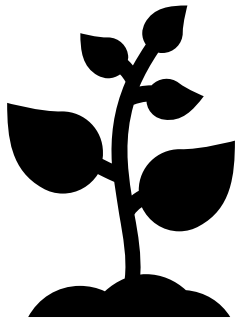
- It is the most cultivated natural fiber in the world.
- It is a perennial, indeterminate and subtropical plant.
- Fiber is not the main product for the survival of the plant.

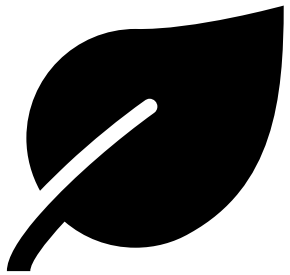


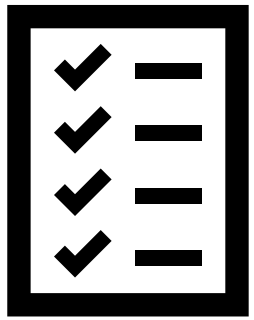
Genetic progress can be defined as the increase of favorable traits obtained from the application of crop breeding methods over of a population through hereditary variation over time

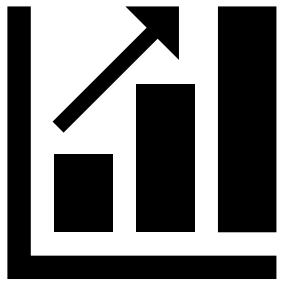












The genetic progress is assessed by comparing the performance of cultivars or varieties released over a given number of years when grown in the same or different environmental conditions and under uniform management practices

Genetic progress in Cotton

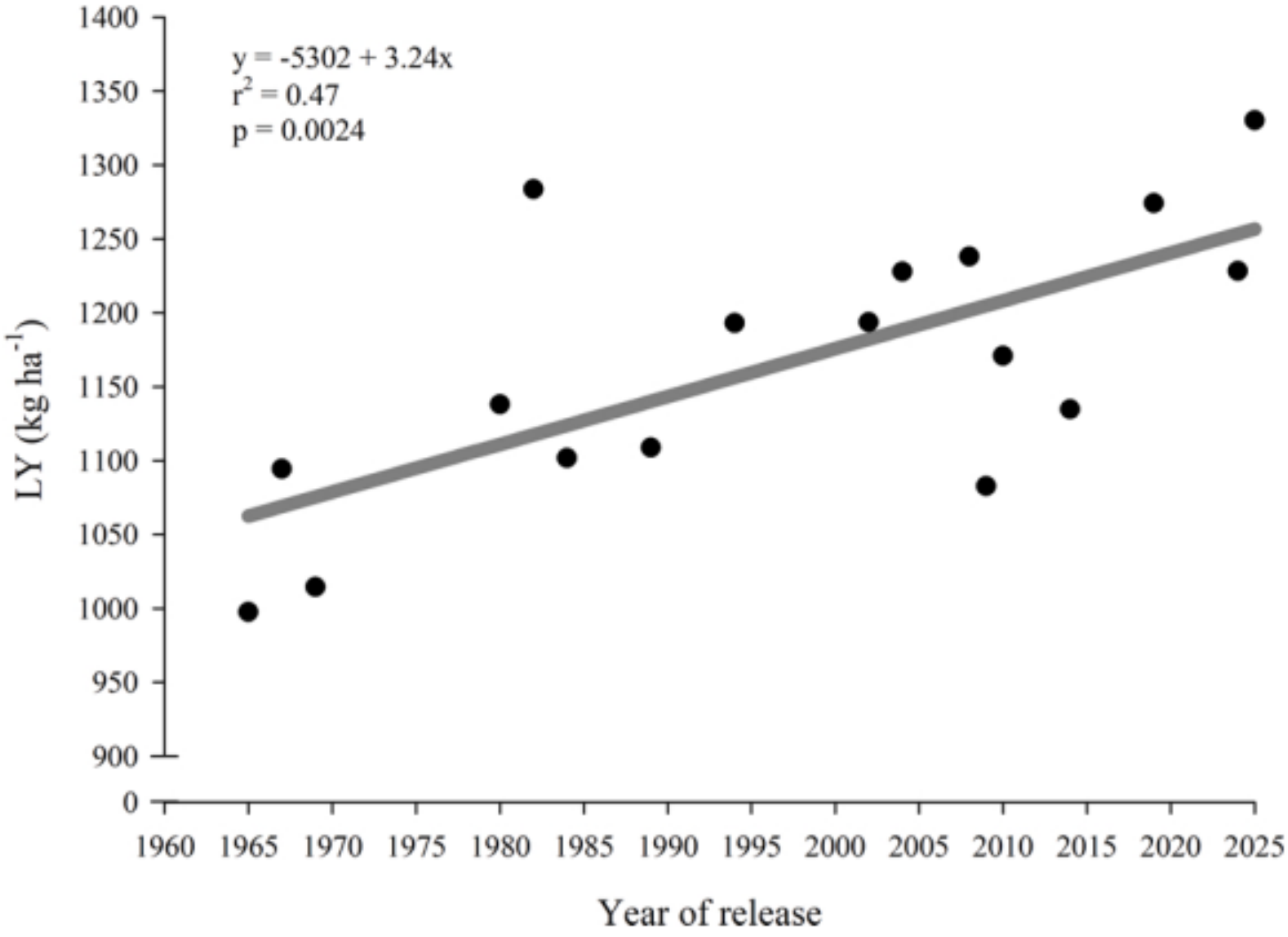
Program	Location	Release dates	Method	Reported lint yield (kg ha^{-1})	No. cultivars	Yield progress (kg ha^{-1} y^{-1})	Yield progress (% y^{-1})	Reason for yield increase and notes	Reference
ECGC	Tanzania	1939-1958	Indirect	67-934	5	11.5*	5.0*	Host plant resistance to bacterial blight and jassids.	Peat and Brown (1961)
Multiple, inc. DP, ST, and Coker	USA (MS)	1922-1962	Direct	565-1201	16	10.2*	2.5*	Primarily increased LP. Also decreased BSz. and SI, increased micronaire.	Bridge et al. (1971)
DP and Coker	USA (TN)	1933-1974	Direct	240-586	6	7.3	2.4	Increased LP (through decreased SI) and BNo.	Hoskinson and Stewart (1977)
Multiple, inc. DP, ST	USA (MS)	1910-1978	Direct	492-1201	17	9.5	1.5*	Increased LP, as well as decreased BSz. and SI.	Bridge and Meredith (1983)
ST and DP	USA (MS)	1905-1978	Direct	650-1283	12	7.1*	1.4*	Increased LP and BNo., while decrease BSz. Earlier maturing, reduced vegetative biomass.	Wells and Meredith (1984c)
USDA ARS (CA Acala)	USA (CA)	1939-1979	Direct	n/a	16	9	n/a	Not mentioned.	Bassett and Hyer (1985)
ST	USA (MS)	1964-1986	Indirect	785-1457	n/a	9.6	n/a	Earlier maturing cultivars.	Bridge and McDonald (1987)
USDA-ARS (Pee Dee)	USA (SC)	1945-1977	Direct	762-1284	20	13.8	3.1*	Increased LP (through decreased SI) and BNo.	Culp and Green (1992)
CNPA	North-eastern Brazil	1976-1994	Indirect	801-3675	46	16.1*	1.0	Based on 8 cultivar subset, increased LP and BSz., decreased maturity.	deCarvalho et al. (1997)
ST and DP	USA (MS)	1938-1993	Direct	617-1088	16	6.1	1.9*	Not mentioned. Figures based on higher N rate (112 kg ha^{-1}).	(Meredith et al., 1997)
USDA ARS & State AES	USA (AZ, NM, TX)	1949-1991	Direct	432-1153	8	16.9	2.3*	Primarily increased BNo., also increased LP, decreased BSz. and SI. *Gossypium barbadense*.	Moser and Percy (1999)
CSIRO	Australia	1983-1998	Indirect	n/a	26	12.9	1.9	Improved yield potential (LP and BNo.) and improved resistance to bacterial blight, Alternaria and Verticillium disease.	Constable et al. (2001)
OK AES	USA (OK)	1918-1982	Direct	132-672* (rainfed = 89-461*)	12	3.7 - 5.6 (rainfed = 1.2–3.0)	1.6*	Various drivers: BSz. and seed size increase; LP increase to 1940s; lint seed^{-1} and lint boll^{-1} increase to 1964 and 1955, respectively. Disease resistance (bacterial blight, fusarium, RKN).	Bayles et al. (2005)
NM AES (NM Acala)	USA (NM)	1929-2004	Indirect	n/a	35	n/a	1.4	Increased LP; decreased BSz. and SI. Based on historical data, thus difficult to separate management effects.	Zhang et al. (2005)
Multiple, inc. DP, ST	USA (TX)	1905-2002	Direct	710-1485	9	8.7	1.0*	Increased LP (through decrease in seeds boll^{-1} and SI) coupled with more# smaller bolls. Figures based on commercial planting density.	Schwartz and Smith (2008)
USDA-ARS (Pee Dee)	USA (NC, SC, GA, MS)	1935-2005	Direct	983-1519	82	2.8^	1.4^	Genetic gains of 28 kg ha^{-1} or 3% per breeding cycle.	Campbell et al. (2011)
CSIRO	Australia	1970-2006	Indirect	1750-2150	23	18.3 ± 4.2 (1995–2009)	1.2 (1995-09)	Yield progress attributed to Genetics (48 %), management (28 %) and GxM (24 %).	Liu et al. (2013)
IRCT	Cameroon	1950-2009	Direct	386–1197	10	3.3	1.7*	Rainfed. Improved quality. No change seed cotton yield, or L, Biomass, RUE, BNo., BSz. or HI.	Loison et al. (2017)
Cultivars released for Xinjiang province	China	1968-2010	Direct	1518-2436	4	14.2	2.4	Yield progress attributed to (i) increased BNo. and LP, as well as increased photosynthetic rates in cultivars released from the 2000s.	Yang et al. (2018)

Conaty et al (2020)

How did we do this in cotton?

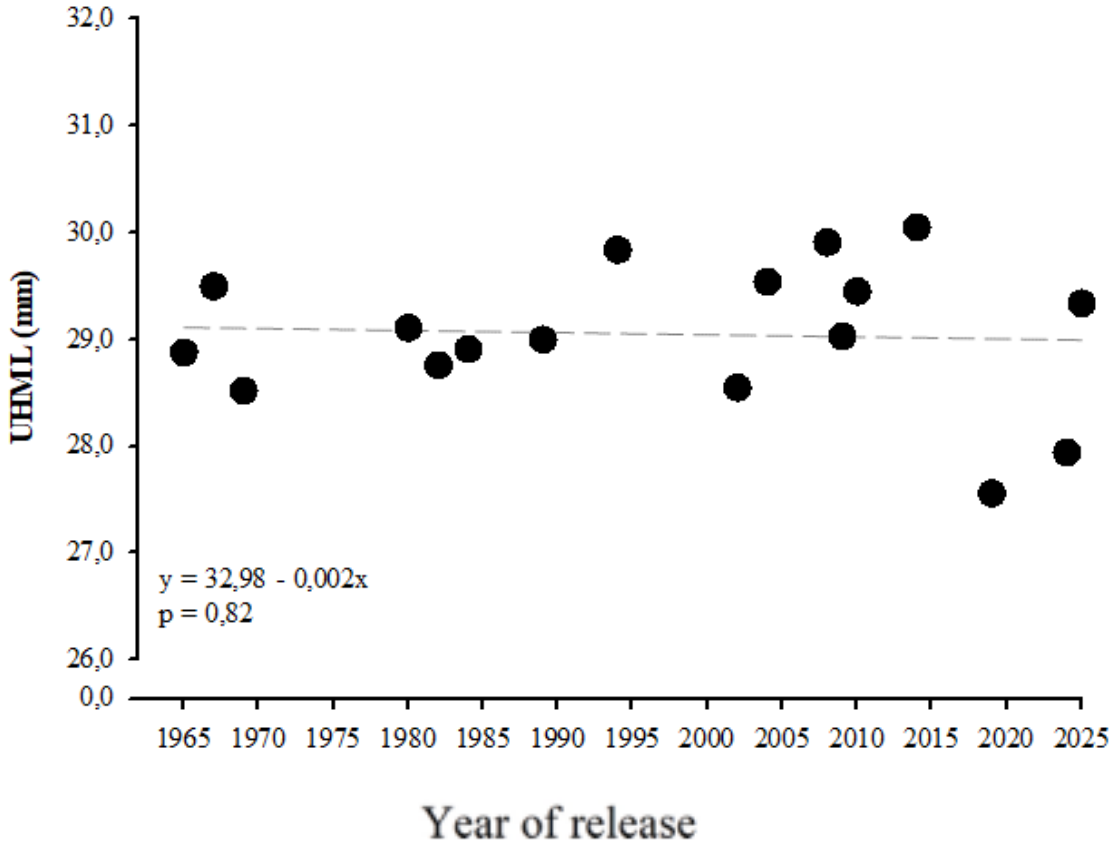
N°	Genotype	Year of release	Origin
1	Stoneville 508	1965[1]	USA
2	Deltapine 16	1967[1]	USA
3	Toba II SP	1969[3]	Argentina
4	Chaco 510	1980[3]	Argentina
5	Porá	1982[3]	Argentina
6	Deltapine 50	1984[2]	USA
7	Guazuncho 2	1989[3]	Argentina
8	Chaco 520	1994[3]	Argentina
9	Guazuncho 2000 RR+	2001[4]	Argentina
10	Guazuncho 3	2004[4]	Argentina
11	Oro Blanco 2	2004[4]	Argentina
12	Poraite	2008[4]	Argentina
13	NuOpal+	2009[4]	Australia
14	Deltapine 402+	2010[4]	USA
15	Deltapine 1238+	2014[4]	Brazil
16	Guazuncho 4+	2019[4]	Argentina
17	Guaraní+	2019[4]	Argentina
18	Porá 3+	2019[4]	Argentina
19	SP 41255*	2024*	Argentina
20	SP 6565*	2025*	Argentina

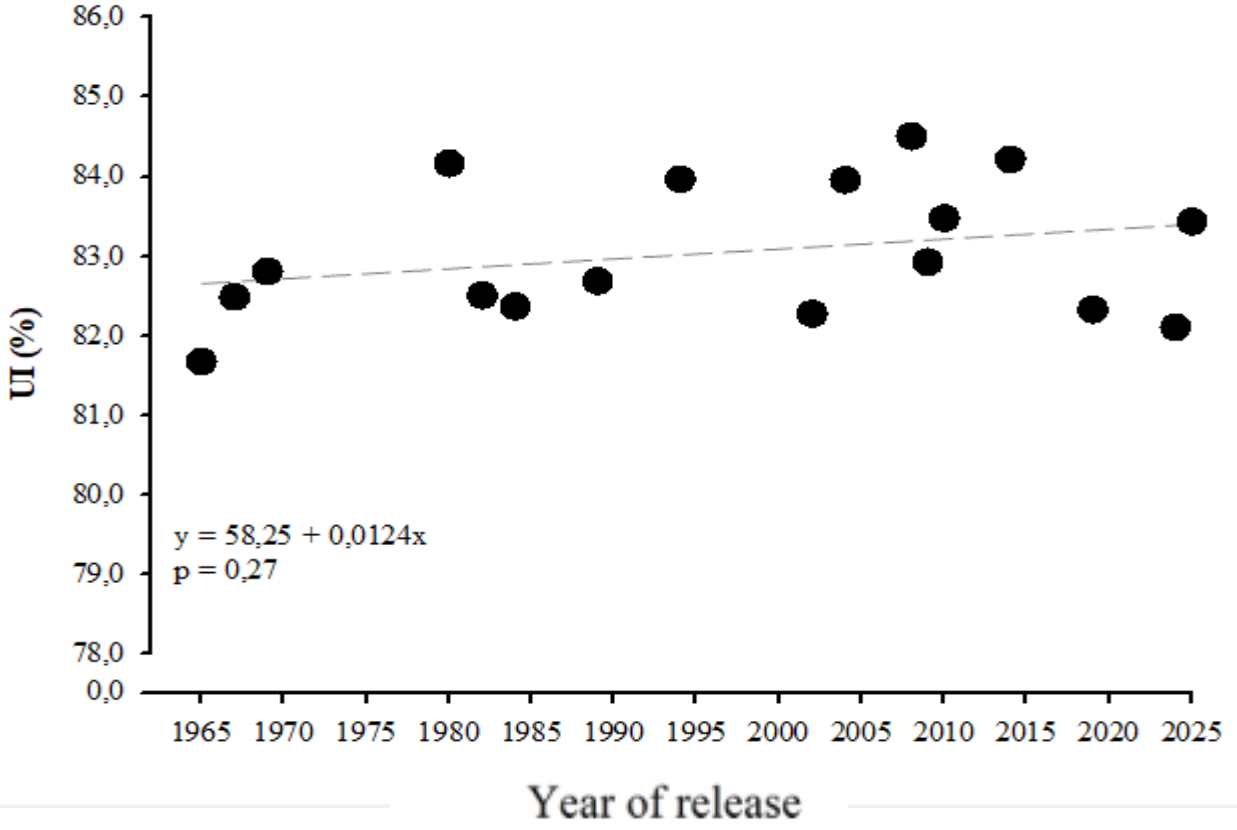
Genetic progress in Argentina



Scarpin et al (2022)

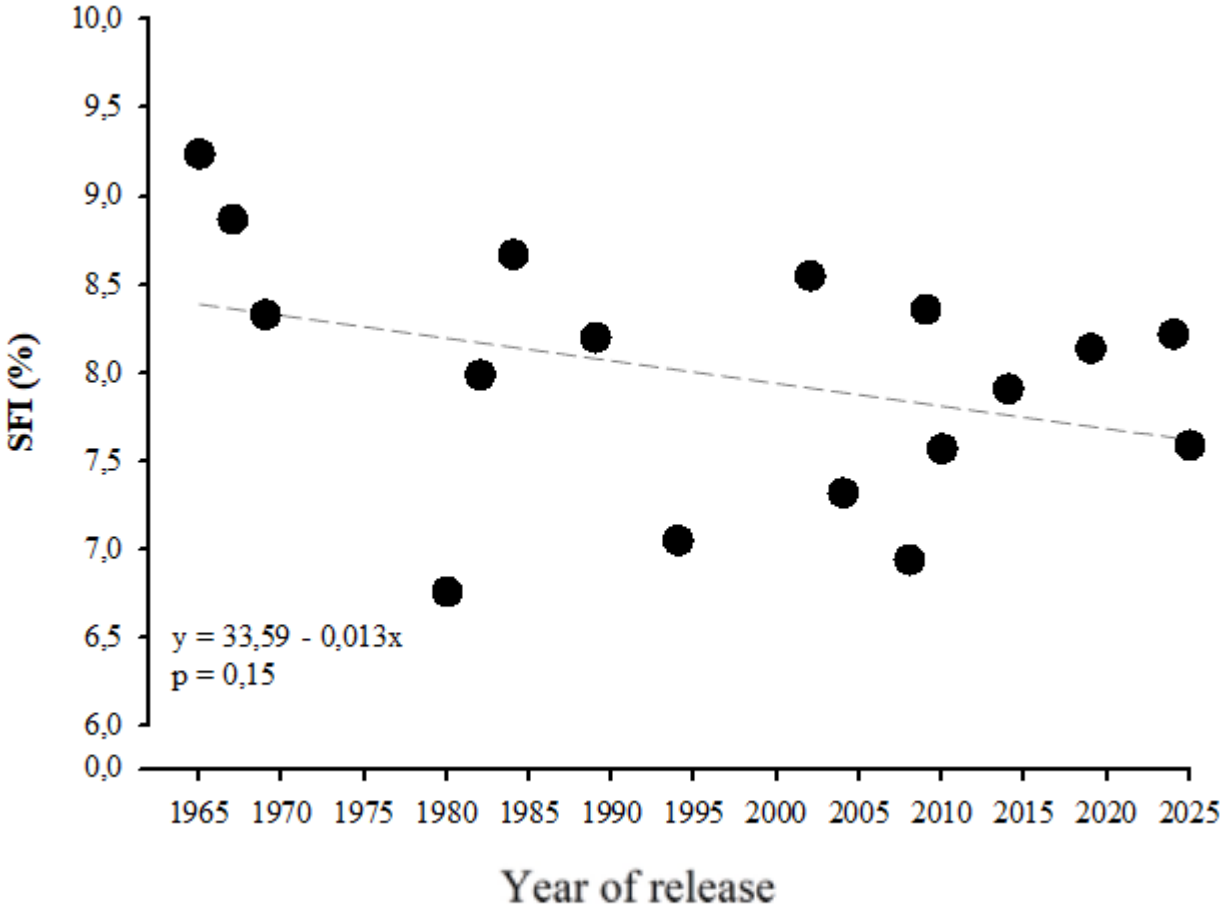
Genetic progress in Argentina

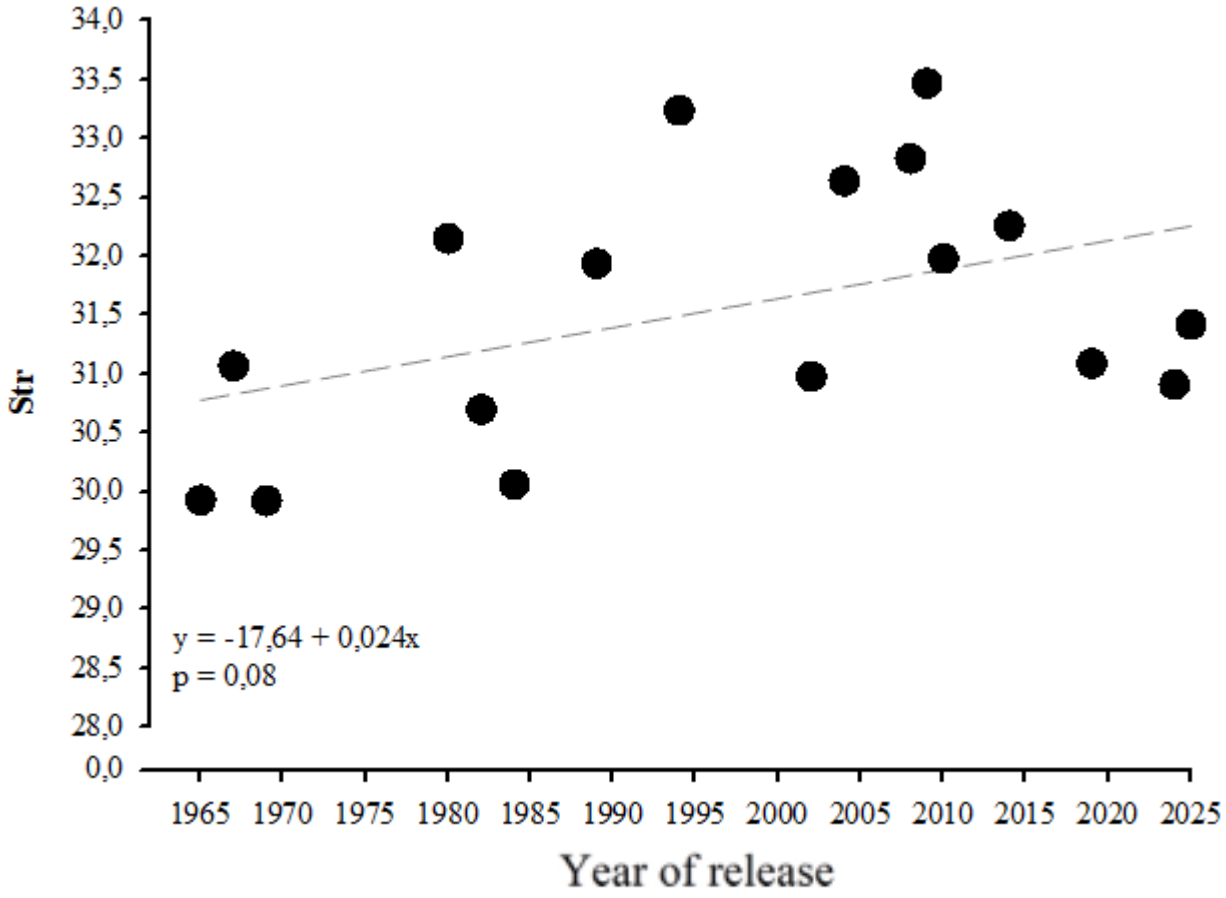




Scarpin in process (2022)

Genetic progress in Argentina





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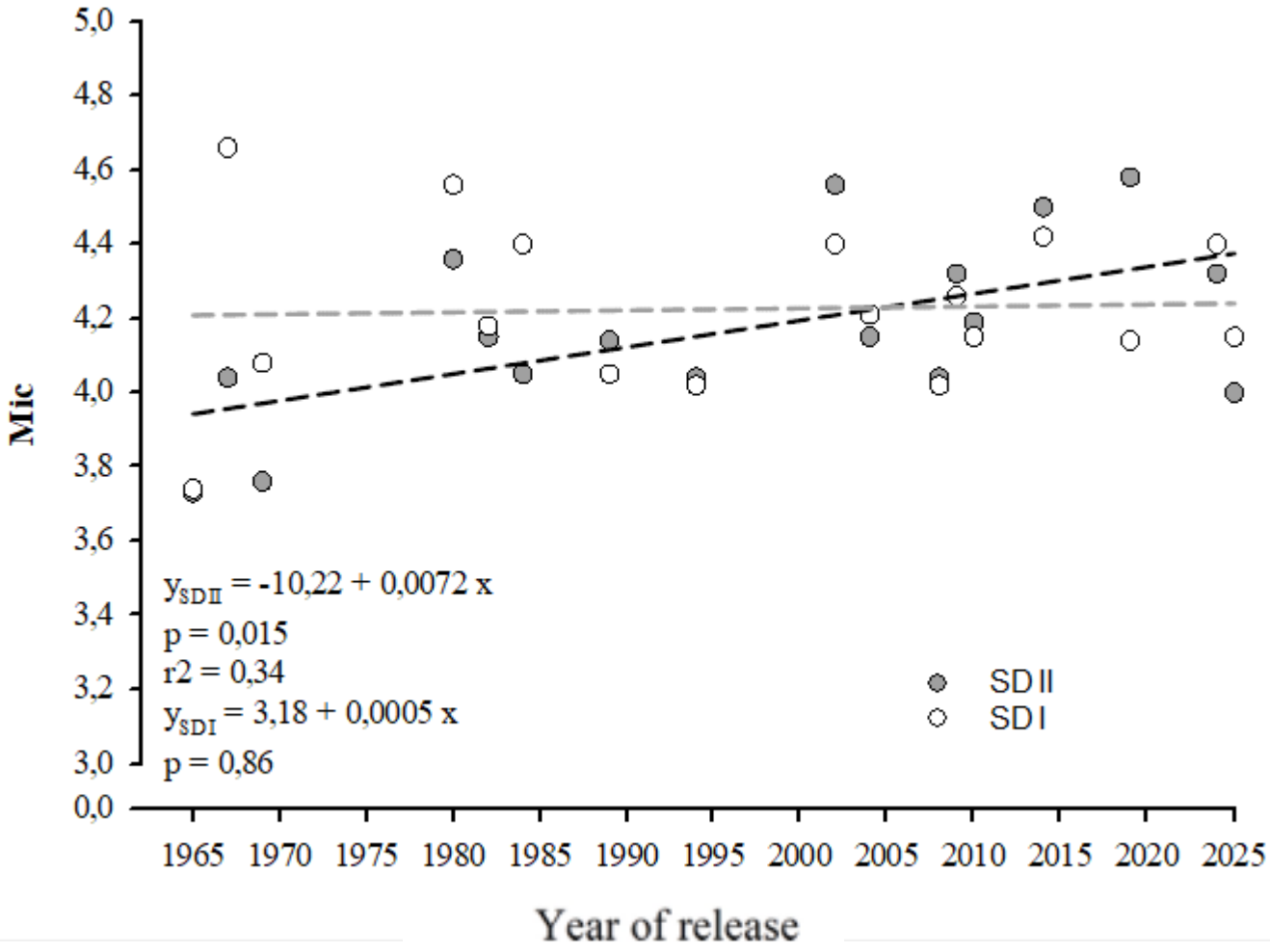
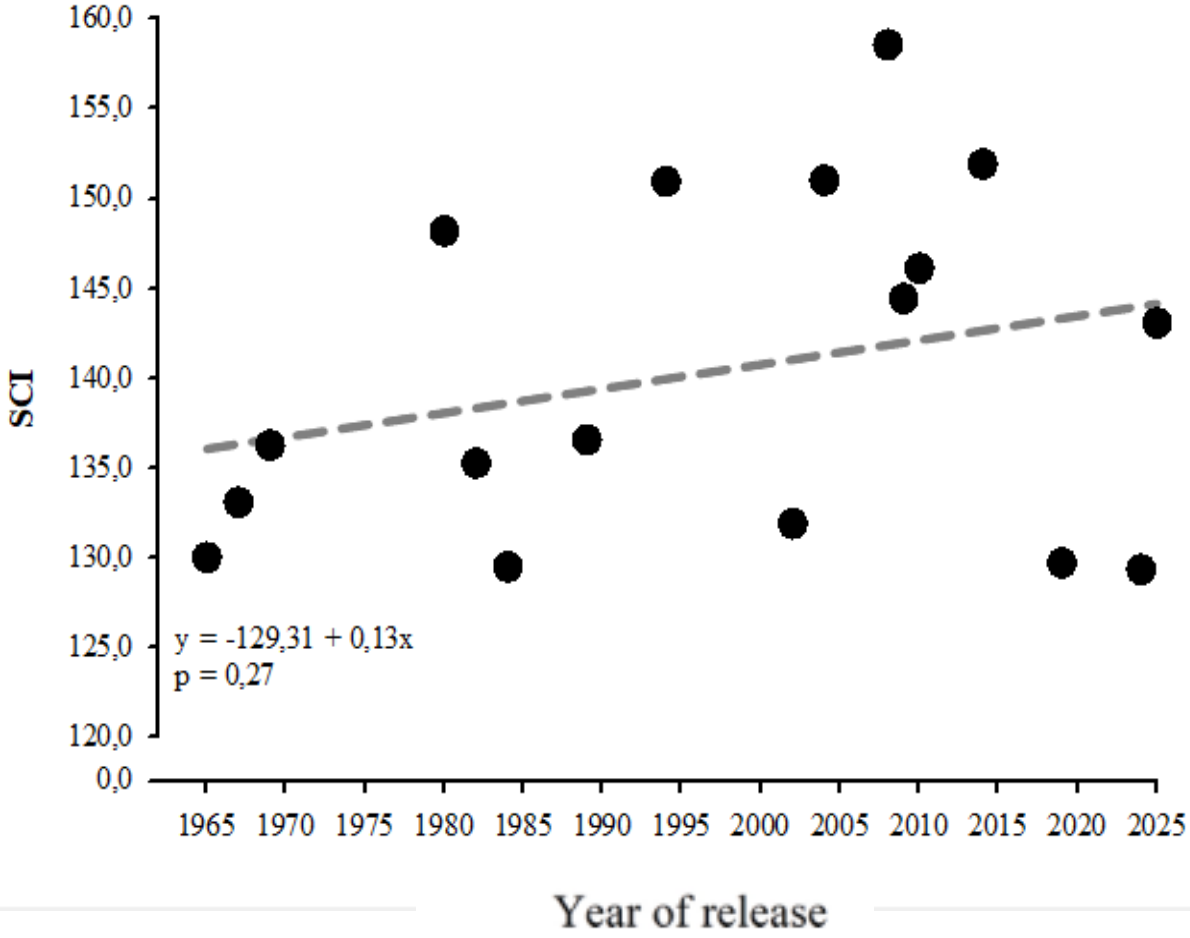
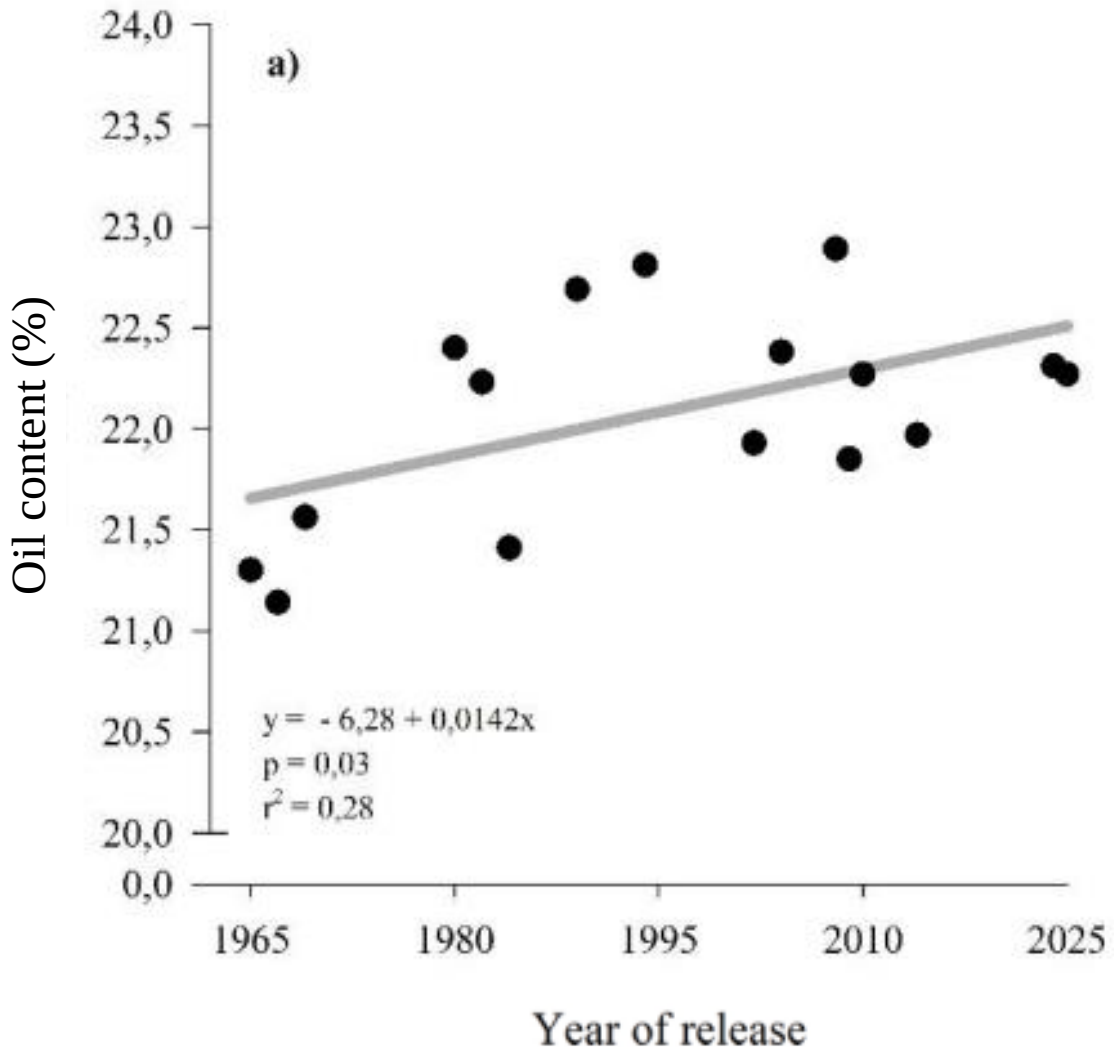
Genetic progress in Argentina

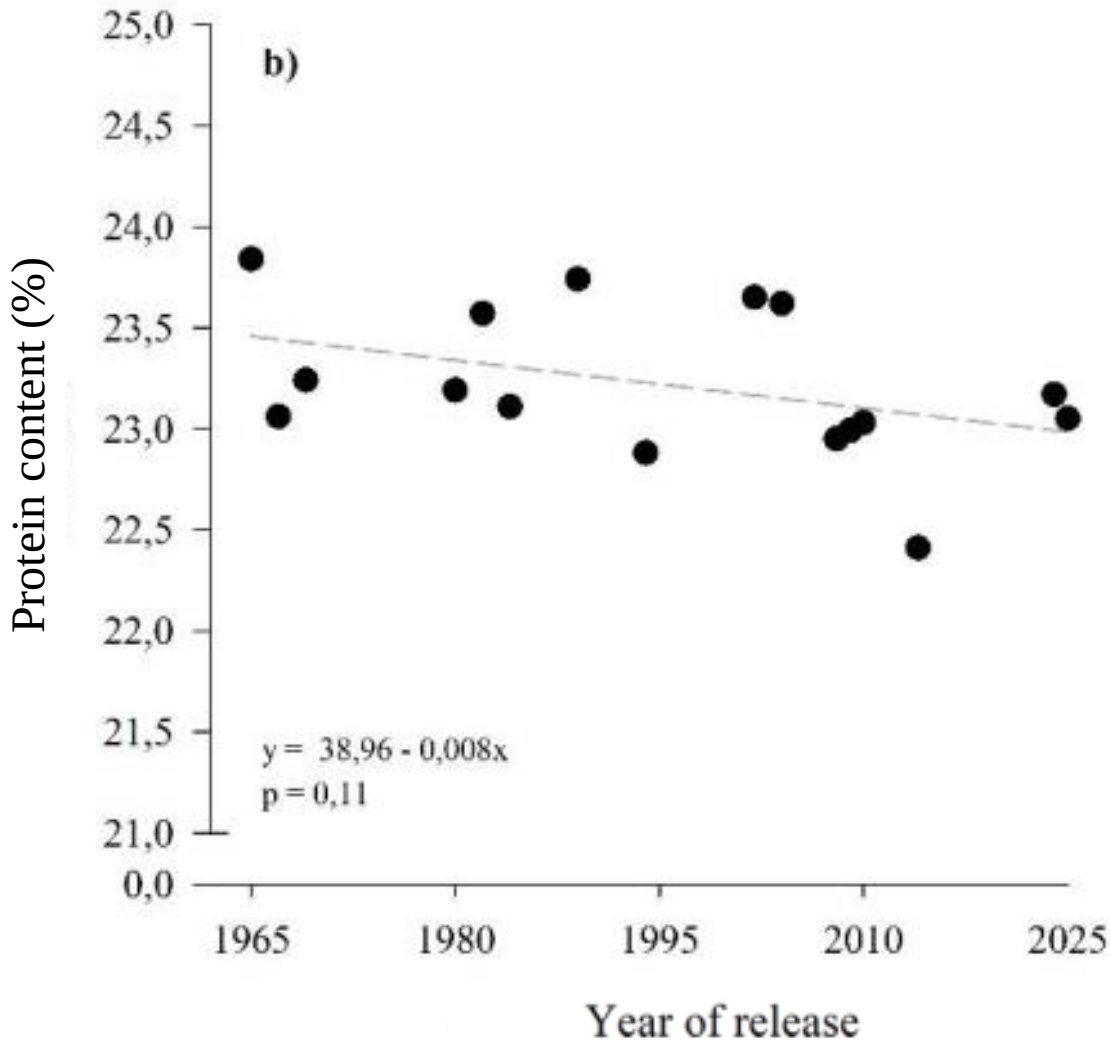




Scarpin in process (2022)

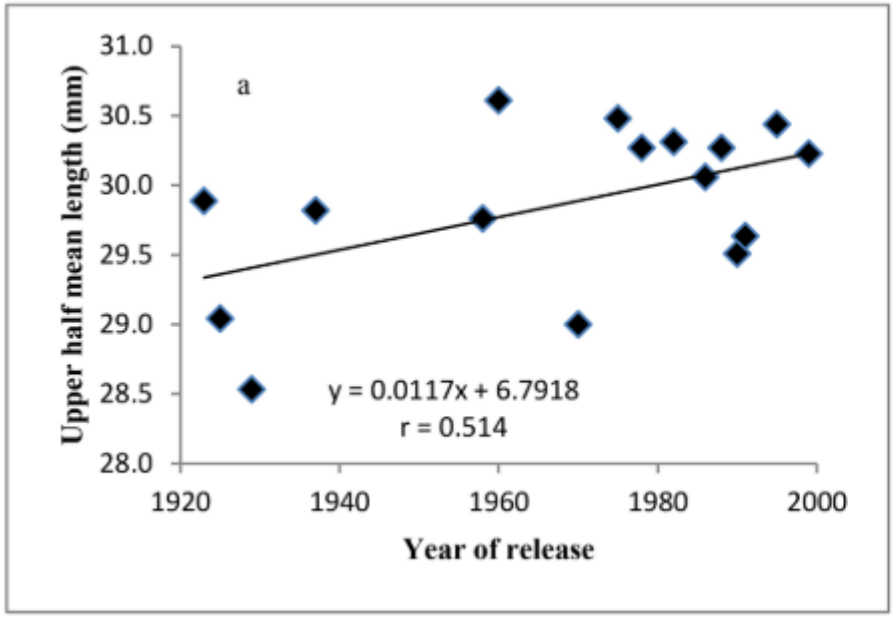
Genetic progress in Argentina

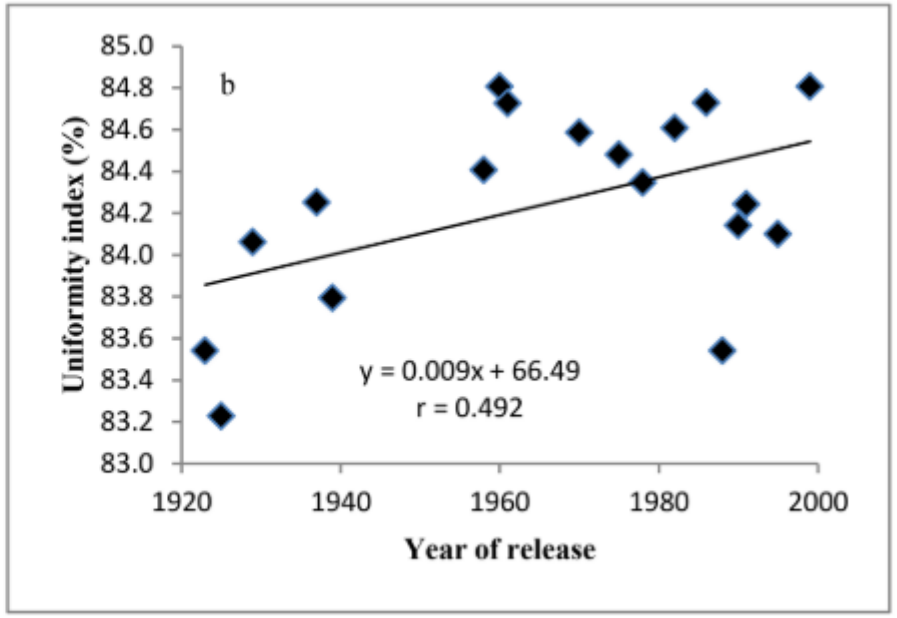




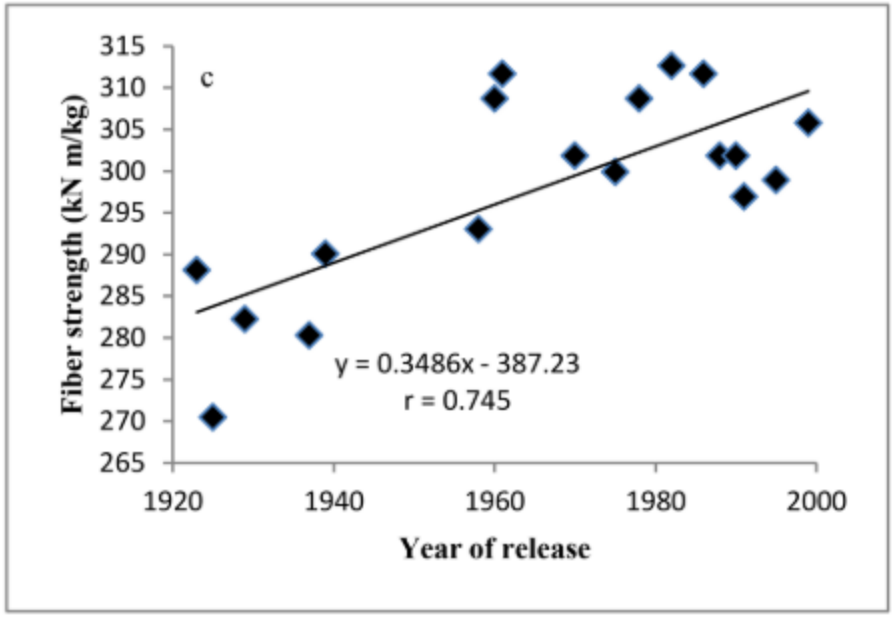
Scarpin in process (2022)

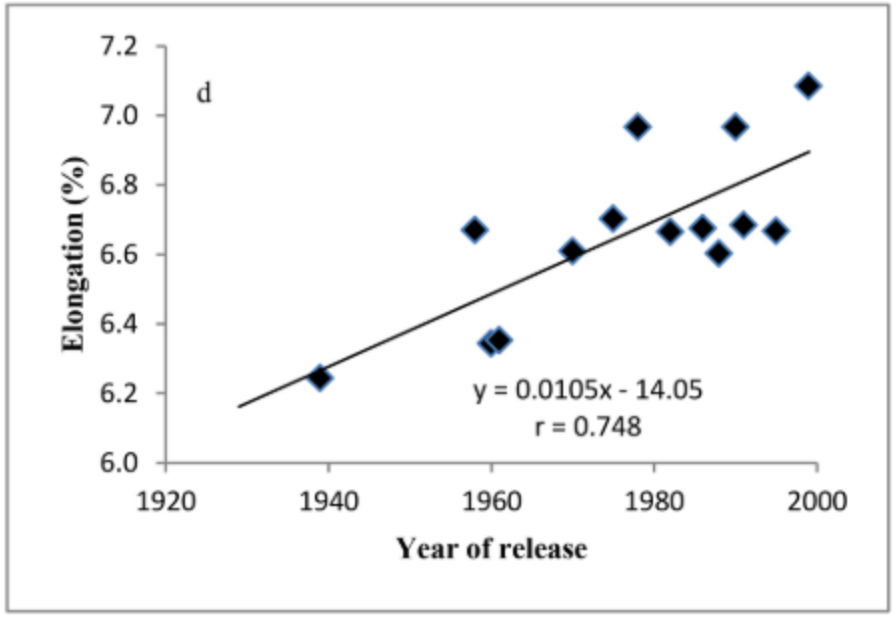
Genetic progress in other countries





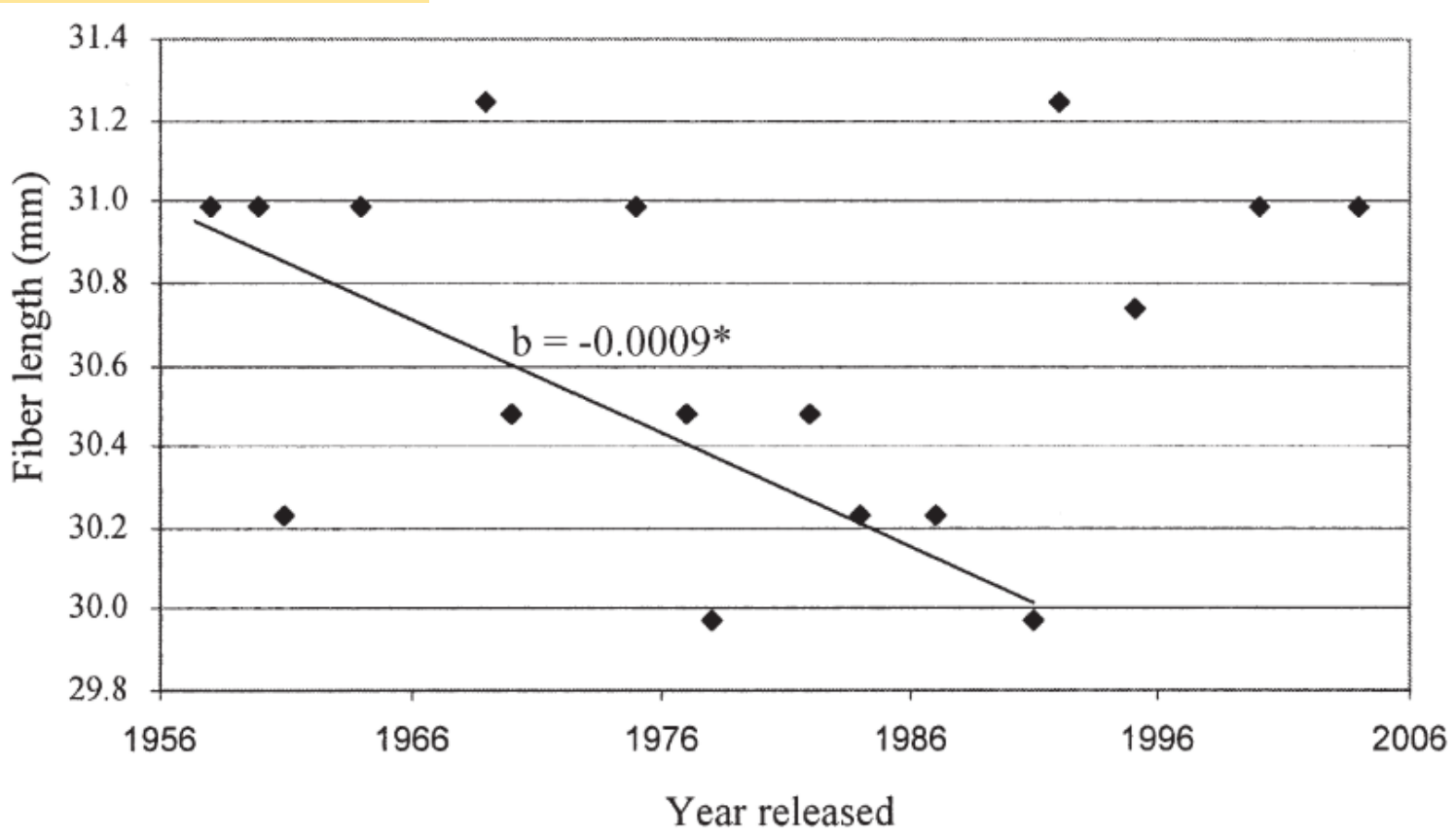
Genetic Gains of Acala 1517 Cotton since 1926. Zhang (2019). Crop Science.





Genetic progress in other countries

Most of the published papers did not find significant genetic progress in their studies.
Bridge et al., 1971;
Campbell et al., 2011;
Culp y Green, 1992;
Wells y Meredith, 1984c;
Zhang et al., 2005



Thanks you

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MÁS+VALOR Fundación

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Tracestory

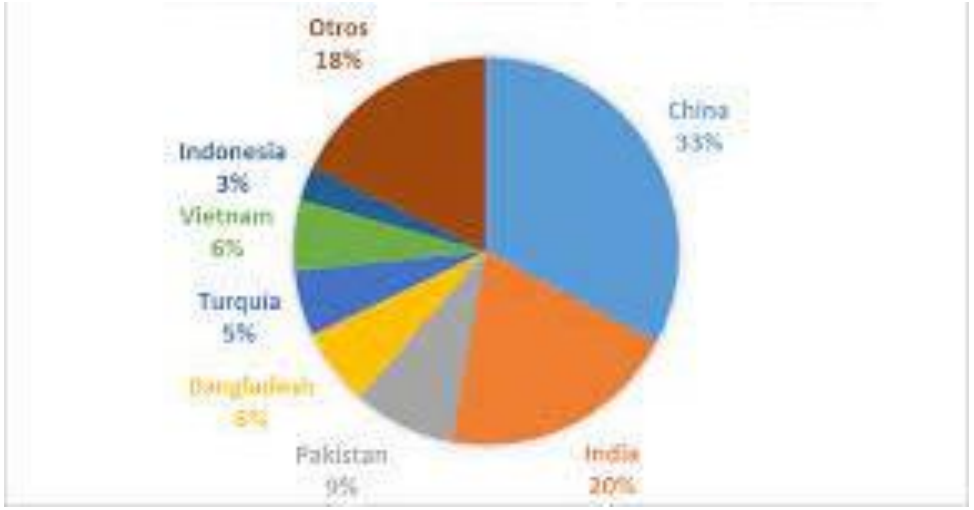
APPA

COTTON REGIONS IN ARGENTINA

EXPORT IN 2021

	FOB	KILOS	TONS
Fiber	106.356.671,09	111.146.918,77	111.147
Yarn	1.875.502,25	684.794,39	685
Knitting	518.311,74	36.248,05	37
Total	108.750.485,08	111.867.961,21	111.867

DESTINATIONS IN 2021



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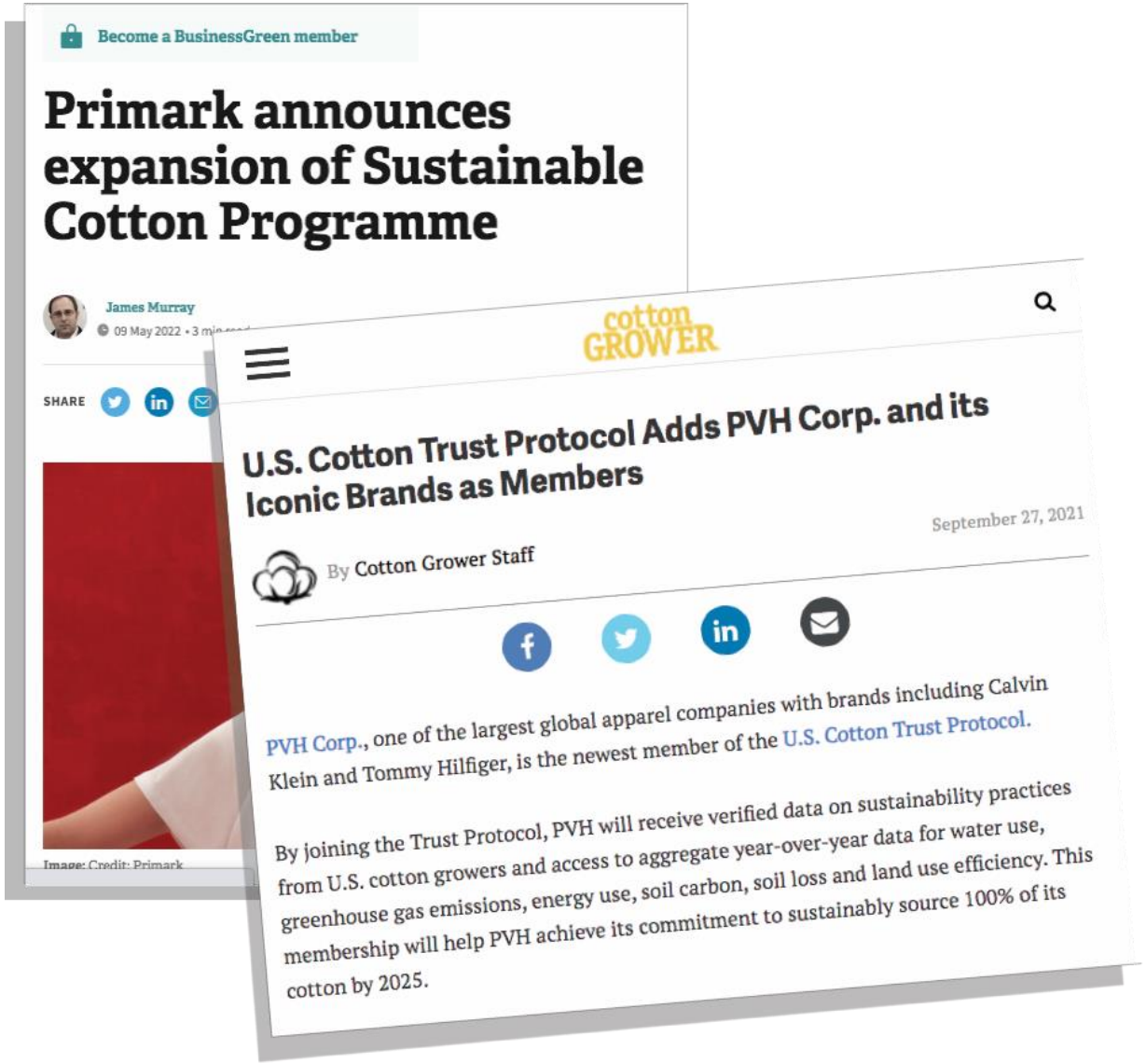

Growing demand for sustainability and information

2025 Cotton Challenge

Access barriers due to unknown or unclear origin of products

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Fragmented information of production process

Encapsulated information in different stages

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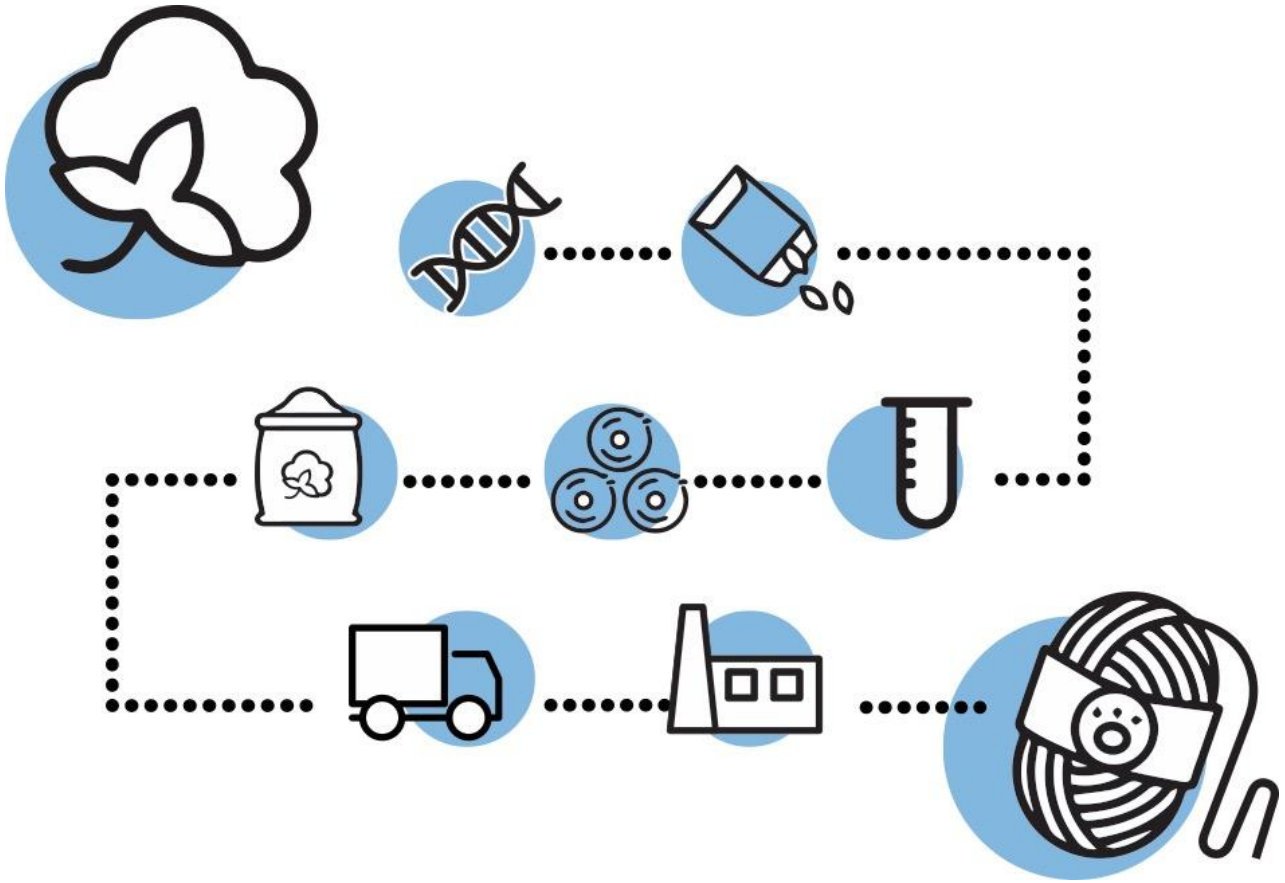

Data **structuring**

Information **transfer**

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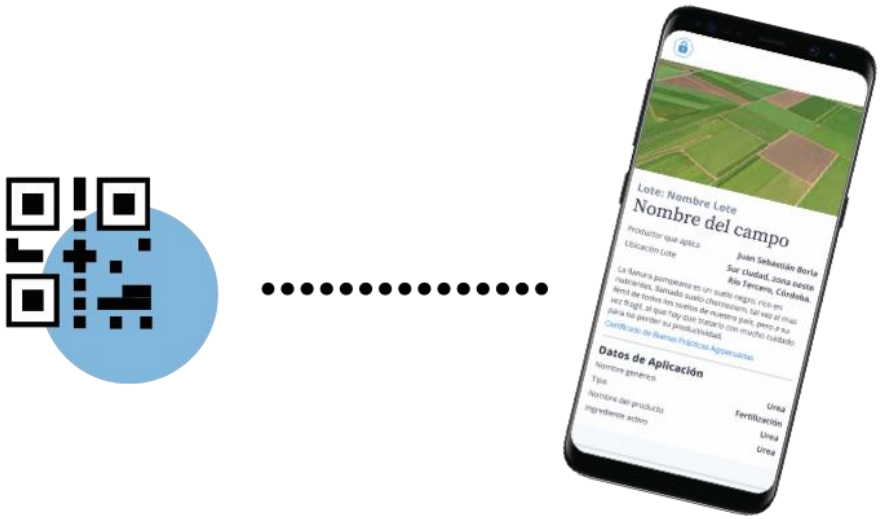
We generate an intelligible and reliable digital record of the **origin and transformation of raw materials**.



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- Control tool
- Susteinability
- Market Diferentiation
- Access to New Markets

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https://algodon.tracestory.com/d96b2f12-8af9-426e-99a4-7e8c05a84547/demo.html

Bale Identification Attached to Bale

Sample ID

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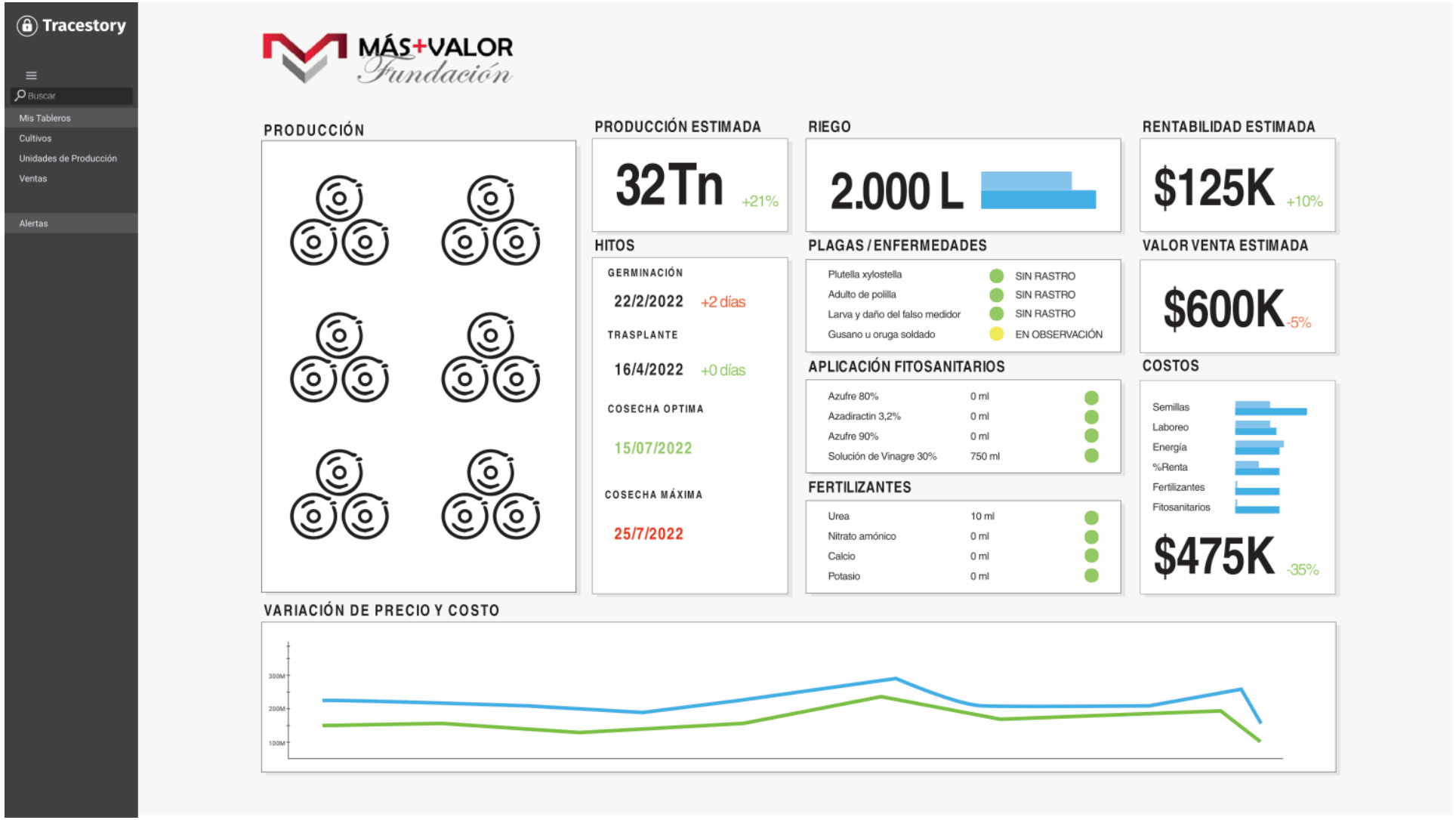

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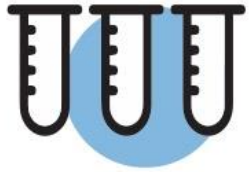
1 Traceability of origin: includes seed, terroir, planting process and tillage

2 After harvest, the producer sends the raw cotton to the gin

3 The gin cleans the cotton. It prepares the bundle and labels it with a unique identifier



4 Samples are taken and an identifier is placed.

5 Fundación Más Valor sends samples to the laboratory and tracks their route.

6 Samples are analyzed at HVI certified laboratories.

7 Laboratory uploads the results using Tracestory's platform.

8 Tracestory matches sample and bundle, and makes the information available in the cloud.

9 Those interested access the information of the bundle via QR code or at FMV's website.

10 Industrialists can continue traceability to final consumer.

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DIFFERENCES WITH OTHER SYSTEMS

1 SAMPLE CUSTODY
(ISO 17048)

2 BALE LOCATION
(GPS)

3 BALE HVI
(Ica Bremen)

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FACILITIES

1 APIs with Good Agricultural Practices (GAP)
BCI – GLOBAL GAP & Others

2 APIs with Good Manufacturer Practices (GMP)
ISO 14001 & Others

3 APIs with Social Responsability
FAIR TRADE & Others

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Thank You!

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