



Breeding for bacterial wilt resistance

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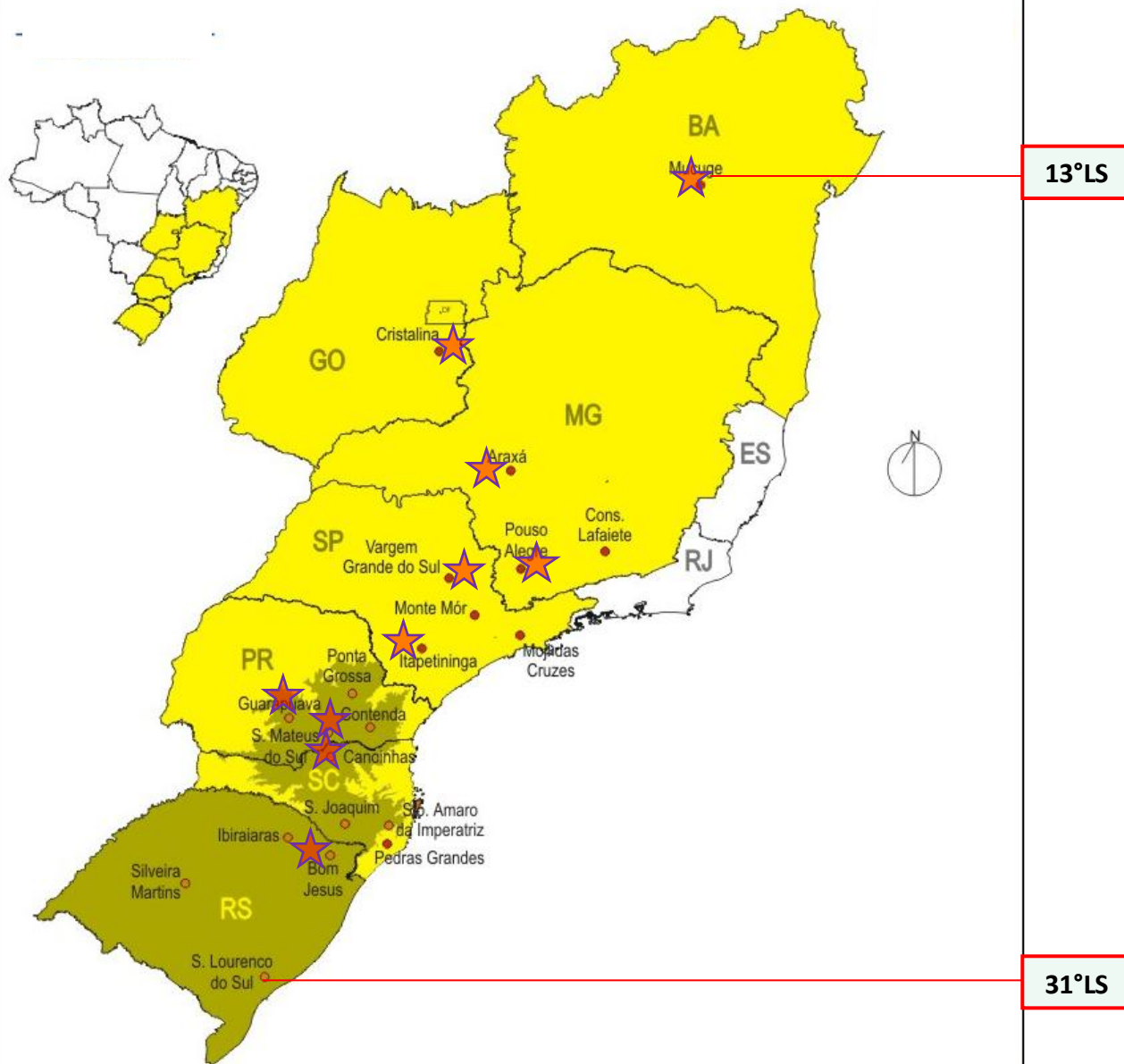
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Embrapa, Brazil

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BRAZIL – Potatoes

- Area: ~300,000 acres
- Production: ~3.7 million tons



POTATO BREEDING PROGRAM OF EMBRAPA

PRIORITIES:

Biotic stresses

- Late blight (*Phytophthora infestans*)
- PVY
- Bacterial wilt (*Ralstonia solanacearum*)
- Early blight (*Alternaria* spp.)

Abiotic stresses

- Heat
- Drought

EMBRAPA POTATO BREEDING PROGRAM

Of those 6 priorities, we are well succeeded on *Potato Virus Y*



BRS F63 – Camila

Source of *PVY* resistance: *Rysto* gene

EMBRAPA POTATO BREEDING PROGRAM

How about BW resistance?

- PROJECT CIP/INIA/CWR/Embrapa – *Solanum commersonii*
- Advances in the Embrapa Breeding Program

PROJECT CIP/INIA/CWR/Embrapa – *Solanum commersonii*
2015: 13 TPS progenies (BW) received from INIA/Uruguay

PROGENY	PARENT		GENERATION
	FEMALE	MALE	
13081	09509.1	Granola	BC3
13084	09501.2	Granola	BC3
12054		95043.11	BC3
13086		Pukara	BC3
11009		97145.4	BC3
12075	Stirling	09509.6	BC3
12074	Rodriga		BC3
13067	Achirana		BC3
12055	09510.5	95043.11	BC3
11013	09510.4	97145.4	BC3
14147	11009.1	394895.7	BC4
14150	11009.2	394903.5	BC4
14148		394895.7	BC4

2016: SEEDLING GENERATION

- 13 progenies
- 1,189 seedlings
- ~100 seedlings/progeny



Photos: C.A. Lopes

2016: FIRST FIELD GENERATION

(2-5 plants/plot)

Selection for:

- tuber appearance

1,189 clones → 189 selected (15.9%)



2017: SECOND FIELD (BW INFESTED) GENERATION OF SELECTION

(7-10 plants/plot)

Selection for:

- BW resistance
- tuber appearance
- absence of internal tuber defects

189 clones → 32 selected (16.9%)

11013-38									
13081-39	13081-72	13081-61	14148-11	13084-43	14150-52	12055-24	13086-26	13082-7	13081-19
11013-12	11013-81	11013-30	11013-78	11013-35	11013-10	11013-20*	11081-56*	13081-53*	13081-66
12074-90	12074-72	12074-80	CNPH G-8	12074-107	12074-113	12074-108	12074-78	13081-40	13067-70
12054-63	12054-36	12054-68	12054-60	12054-87	13067-71	13067-31	13067-9*	13067-62	13067-53
11013-85	11013-19	11013-2	11013-39*	11013-73	11013-83	11013-82*	11013-74	11013-7	11013-47
12074-24	12074-6	12074-99	12074-28	12074-110*	12074-106	MB 9846-01	12054-42	12054-58	12054-31
11009-29	11009-9	11009-33	11009-52	11009-70	11009-22	11009-27	11009-8	12054-90	12054-70
12054-33	14148-19	14148-51	14148-17	14148-39	14148-53	14148-27	14148-20	14148-16	F6-09
13084-26	13084-77	13084-3	13084-49	H-11	13084-48	13084-36	13084-35	13084-50	13086-73
14150-44	14150-14	14150-65	14150-33	14150-54	14150-37	Bel	14150-60	14150-57	14150-16
12075-42	12075-49	12075-30	12075-50	12075-67	12075-11	12075-83	12075-25	MB-03	14150-25
13086-13	13086-60	13086-59	13086-57	CNPH F3-06	13086-72	13086-92	13086-96	13086-37	13086-17
11013-64	11013-26	A-9	11013-51	11013-23	11013-3	11013-48	11013-65	11013-33	14150-20
14150-59	Asterix	11009-24	11009-53	11009-73	11009-8	11009-39	11009-76	11009-48	13086-32
14150-38	14150-64	14150-48	Monalisa	14150-53	14150-72	14150-20	14150-79	14150-42	14150-6
13086-48	13086-30	13086-70	13086-81	13086-41	F7-04	13086-46	14148-7	14148-66	12055-30
14148-65	14148-12	14148-22	14148-55	14148-25	14148-67	14148-37	Agata	14148-9	13086-54
12054-88	12054-95	12054-82	12054-29	12054-67	12054-32	12054-100	12054-47	12054-93	Cruza 148
14147-24	12054-37	12055-40	12055-21	12074-22	12055-15	12055-48	F6-03	12055-11	12055-4
MB195-10	14147-57	14147-39	14147-63	14147-64	14147-59	14147-20	14147-1	12055-41	12055-28

Outstanding clones for good BW resistance and plant vigor

Very susceptible clones to BW

2017: SOME SELECTED CLONES IN THE SECOND FIELD GENERATION



Photos: C.A. Lopes

2018: THIRD FIELD (BW INFESTED) GENERATION OF SELECTION

(10 plants/plot, 3 reps)

Selection for:

BW resistance, plant vigor, no virus symptoms,
tuber appearance, absence of internal tuber defects

32 clones → 14 selected (43.8%)



2019: FOURTH FIELD (BW INFESTED) GENERATION OF SELECTION

(10 plants/plot, 3 reps)

Selection for:

BW resistance, plant vigor, no virus symptoms,
tuber appearance, absence of internal tuber defects

32 clones → 14 selected (43.8%)

1- **11.013-81**
(low vigor)

2) **11.013-20**
(leaf roll)

3) 14.148-66
(Ok)

4) MB 9846-01
(Ok)

5) MB 03
(Ok)

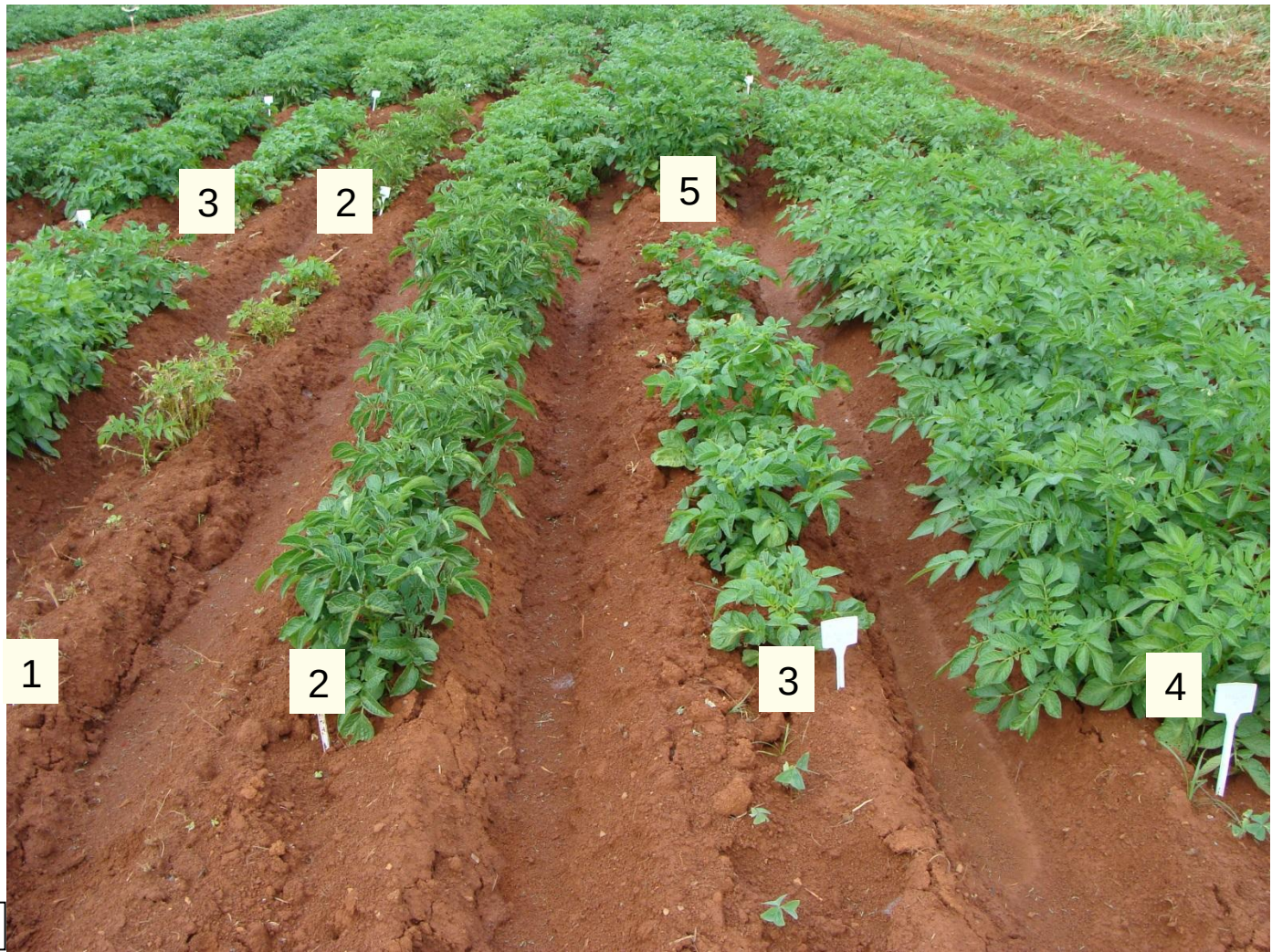


Photo: C.A. Lopes

SELECTED CLONES

2018: Third field generation – 14 clones ↓

2019: Fourth field generation – 5 clones ↓

Wilted plants (%)



SUMMARY

PROJECT CIP/INIA/CWR/Embrapa – *Solanum commersonii*

- 2015: 13 TPS progenies from INIA/Uruguay
- Each progeny was derived from a cross with a BW resistant parent

Progeny	Parent		Generation	# of selected clones		
	Female	Male		2017	2018	2019
13081	09509.1	Granola	BC3	0	0	0
13084	09501.2	Granola	BC3	1	0	0
12054		95043.11	BC3	2	1	0
13086		Pukara	BC3	1	0	0
11009		97145.4	BC3	0	0	0
12075	Stirling	09509.6	BC3	0	0	0
12074	Rodriga		BC3	3	1	0
13067	Achirana		BC3	1	0	0
12055	09510.5	95043.11	BC3	2	0	0
➡ 11013	09510.4	97145.4	BC3	8	6	2
14147	11009.1	394895.7	BC4	6	2	0
➡ 14150	11009.2	394903.5	BC4	2	2	1
➡ 14148		394895.7	BC4	6	2	2

EMBRAPA'S ELITE CLONES FOR BW RESISTANCE

Wilted plants (%)

INIA CLONES X EMBRAPA'S ELITE CLONES

EMBRAPA

INIA

Wilted plants (%)

THE BEST CLONES FROM INIA/URUGUAY

- BW resistance
- acceptable tuber appearance
- no virus symptoms
- absence of internal tuber defects



THE BEST CLONES OF EMBRAPA





Carlos Alberto Lopes

30 years dedicated to improvement for BW resistance!!!

THANK YOU!

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