

NE Borlaug
WHEAT IMPROVEMENT PROGRAM.

Wheat Improvement Program

I- Objective

A - Make Mexico self sufficient in wheat.

- 1) - Current Annual production - (1946) 13,500,000 bu. on 1,200,000 acres
- 2) - Current annual importation (1946-47) 15,400,000 bu.
Domestic consumption (1945) - 29,000,000

II- Principle Production areas & Characteristics of Region.

<u>A - Production Region</u>	<u>% of Production</u> (Toneladas)	<u>Area</u>
Norte	16 %	102,799 Ha.
La Laguna	17 %	81,180 Ha.
West Coast (Yaqui, Mayo, Mex.)	16 %	93,000 Ha.
Bajio	22 %	119,502 Ha.
Other	29 %	- - - -
Puebla.		
Oaxaca		
Michoacán		
Chiapas		
Chapala.		

B - Type of Production and Agronomic Considerations.

1) Norte

- a) Riego
- b) Planting Oct. 1 - Dec. 30.
- c) Type of farming.
 - (1) Rotation. Corn-Wheat.
 - (2) Small farms. Hand seeding, harvesting with sickle.
 - (3) Except Arteaga, Nadadores, etc. - Large Valleys - Mechanized.

2) La Laguna

- a) Riego
- b) Planting - Nov. 1st.-Dec. 15th.
- c) Type of farming.
 - (1) Rotation. Cotton-Wheat
 - (2) Mechanized.

3) West Coast

- a) Riego
- b) Planting. Nov-Dec.
- c) Type of Farming.
 - (1) Rotation
 - (a) Rice - S. Clover - Wheat
 - (b) Wheat - Flax - Rice
 - (c) Cotton - wheat
 - (2) Mechanized farming.

4) Bajío

- a) Piezo
- b) Planting. Oct - Dec. 15
- c) Type of farming.
 - (1) Rotation. Corn-wheat
 - (2) Sicble - Combine

5) Other areas. (Puebla, Oaxaca, Amecameca, Morelia, Chiapas, Chapala)

- a) crops and temporal
- b) Planting - Sept. - Dec.

III- Breeding Program objectives.

A- Develop higher yielding varieties - A. Winter

B. Summer.

- 1) Genetically higher yielding lines.
- 2) Disease resistance.
 - a) Rust
 - b) Root Rot
 - c) Loose Smut
 - d) Bunt.

B- Varieties better adapted to improved rotations

- 1) Earliness. - which permits preparation of land for subsequent crops.
- 2) Frost escaping.
- 3) Maturing before rains begin.

C- Resistance to lodging.

D- Resistance to shattering.

E- Better quality.

F- Drought resistance.

IV- Program to Date.

A- Collection of Material

- 1) Collection and evaluation of native wheats.
- 2) Collection and evaluation of introduced wheats.
 - a) Hard red Springs.
 - b) White wheats.
 - c) Soft red Springs.
 - d) Durum.
 - e) ...

B- Evaluation of Native and Introduced material.

- 1943 - 44 Grown for observation at Chapingo & Tehuacán, Pue.
- 1944 - 45 Grown in yield test at Chapingo & Tehuacán, Pue.
- 1945 - 46 Grown in yield test at:
 - 1) Chapingo, Mex.
 - 2) Tehuacán, Pue.
 - 3) Ericebas, Mich.
 - 4) Cortazar, Gto.
 - 5) Torreón, Coah.
 - 6) Saltillo, Coan.
 - 7) Pabellón, Ays.
 - 8) El Yaqui, Son.

- 1946 - 47 To be grown in yield at:
- 1) Chapingo, Mex.
 - 2) La Laguna, Torreón, Coah. (2)
 - 3) Huichichil, N. L.
 - 4) Nadasores, Coah.
 - 5) Zaragoza, Coah.
 - 6) Celaya, Gto.
 - 7) San Juan del Río, Gro.
 - 8) León, Gto.
 - 9) El Yaqui, Son.
 - 10) Zitacurro, Mich.
 - 11) San Hipólito, Pue.

- 1946 - 47 Breeding material
- a) Chapingo, Mex.
 - b) La Laguna, Coah.
 - c) Bajío
 - d) Sonora
 - e) Huichichil, N. L.

C- Results of 1945-46 yield tests.

Principle yield tests.

- Late varieties simple Lattice - 3 row plots with 4 replicates.
- Early varieties simple Lattice - 3 row plots with 4 replicates.
- Taboada Selections simple Lattice - 3 row plots with 4 replicates.
- New collections triple Lattice - 3 row plots with 3 replicates.
- Mcadden Bults simple Lattice - single row with 4 replicates.

- Check varieties were Harroqui 508 and Newthatch.

Highest yielders

Exp. I Early varieties.

- 1) Sonora (Desconocido B.C.)
- 2) Montana
- 3) Cameron
- 4) Colorado Obregón.
- 5) Harroqui
- 6) Trigo Supr. x 41-116 (RF 211)
- 7) Peru.

Exp. I Late varieties.

- Rojo
- Lagunero
- Torreón
- Palón Colorado
- Frontaira x 41-116 (RF 209)
- Kenya 9906 (RF 324)
- Kenya 10866 (RF 321)
- Kenya 10862 (RF 325)
- Carlton
- Mindua

Exp. III Trigo Invierno of NO value.

Exo. X Taborda Selections.

Cristalino (Col. 02-2) RF 503.
Criollo (Col. 35-A) RF 489

Exo. II - A & B. McFadden Bulks.

(41-116) x Thatcher.
Thatcher x Renard
Fronteira x 41-116
41-24-2-2 x Early Blackhull.
Sel. II x Early Blackhull.
F.P.I. 193539 x 41-116
Renacimiento x 41-116
Trigo Supr. x 41-116
Triunfo x (K x G)
Hope x Med. x Gasta.

Proposed Summer yield test for 1947

We propose to include the best new McFadden Selections and also the best of the selections from our first crosses in limited yield tests next summer.

V- Present Status of Program.

A- Lines now being multiplied.

- 1) Fronteira x 41-116 (RF 209)
- 2) Kenya (RF 321)
- 3) Kenya (RF 324)
- 4) T. Supreme x 41-116 (RF 211)
- 5) T. Supreme x 41-116 (RF 217)
- 6) Renacimiento x 41-116 (RF 235)

B- Place of multiplication.

- 1) Principe - Chapingo
- 2) Sajio
 - a) Aguilar - Cortazar RF 211
 - b) Roque - Celso RF 236
 - RF 236
 - RF 321
 - RF 442
- 3) Sonora (Campo Experimental)
 - Kenya RF 321
 - Kenya RF 324
- 4) Puebla - RF 217 (Ejido)
- 5) Norte
 - Guevara RF 211
 - RF 217
 - RF 235
 - RF 321
 - RF 324
 - RF 442
- 6) Laguna
 - Association of Private Growers at Torreón RF 321
 - RF 324
 - RF 211
 - RF 209

7) ... Kenya RF 321 ... RF 209

C- Selections

- 1) Natives: More than 10,000 selections were made in farmers fields during 1945-46.
 - a) Best of these now in yield test or seed increase.
 - b) Need for classification of native wheats.
- 2) Selections made in McFadden Bults:
 - a) 5,000 Selections were made in McFadden Bults under 3 different environments - Chapingo, Bajío, Sonora.

D- Breeding Program in Detail

- 1) First crosses made in April 1945 - Now in F4 gen.

<u>a) Best Natives</u>	<u>Introduced</u>
Marroqui	Benown
Mentana	Regent
Candeal	Pilot
Pelón Colorado	Mida
Aguilera	Rival
	Newthatch
	Thatcher
	Kenya
	T. Supreme x 41-116
	Renacimiento x 41-116

- 2) First Backcrosses Made in Summer 1945

- 3) Method used - Modified Pedigree

- a) First individual plant selections made in F2 plants. (In some crosses selections carried into F3 Bults)
- b) Further selections made on progeny basis in F3 and F4 lines.
- c) Hope to Bulk Selections in F4 (or F5) and put them into preliminary yield tests next year.

x F2 Bulk seed is divided into two groups - One series to be grown under Winter conditions and one series under Summer conditions.

- d) Regions where beginning selections are to be made.

(1) Winter

- (a) Chapingo
- (b) Bajío
- (c) Sonora
- (d) Laguna
- (e) Huichichil Sierra, N. L.

(2) Summer

- (a) Chapingo
- (b) Bajío
- (c) Huichichil Sierra, N. L.

- 4) Present status of lines and crosses.

Lines in F4 - (144 Line crosses)

- a) 2,500 Selections originating from 700 F2 selections made under Winter conditions at Chapingo.
- b) 632 originating from F3 Sel. made in F3 Bults under Summer conditions at Chapingo.

Lines in F3

C.S. - 242 (lines)
 C.R. - 149
 C.T. y C.D. - 92

2293 selections made
 under Summer conditions
 at Chapingo.

Lines in F2 -(Still no selections made)

C.S. - 63
 C.R. - 150
 C.R.2 - 110
 C. T. - 30
 C.D. - 50

Lines in F1

355 Lines in total, mostly C.R.

5) Most Promising Crosses

<u>Cross</u>	<u>Generation</u>
Aguilera x Kenya	4
Cameron x Kenya	4
Mentana x Kenya	4
- - - - -	
Marroqui x Newthatch	4
Mentana x Newthatch	4
Desconocido B.C. x Newthatch	4
- - - - -	
Pelón Colorado x Renown	4
Marroqui x Renown	4
T. Supreme x 41-116 x Renown	4
Pelón Colorado x Aida	4
- - - - -	
Marroqui x Pilot	4
Marroqui x T. Supreme x 41-116	4
Marroqui x Regent	4
Cameron x Egypt	4
Dreve x Kenya	4

Promising F3 crosses.

Candéal x Kenya
 Marroqui x T. Supreme x 41-116
 Mentana x T. Supreme x 41-116
 Mentana x Newthatch
 Candéal x Newthatch
 Colorado Obregón x Newthatch
 Querétaro x Newthatch
 Marroqui x Newthatch
 Querétaro x (H44 x Thatcher)
 Rojo x (H44 x Thatcher)
 Querétaro x (Renacimiento x 41-116)
 Renacimiento x 41-116 x Kenya
 Thatcher x T. Supreme x 41-116

Promising First Backcrosses (Now F3 seed)

(Aguilera x Kenya) x Kenya
(Cameron x Kenya) x Cameron
(Cameron x Kenya) x Kenya
(Kenya x Harroqui) x Harroqui
(Kenya x Harroqui) x Kenya
(Montana x Kenya) x Montana
(Newthatch x Harroqui) x Harroqui

Promising crosses in F2 Generation.

Egypt x T. Supreme x 41-116
Egypt x Kenya
Egypt x Tinstein
Kenya x Aguilera
Kenya x Ramona
Kenya x Cameron
Kenya x Peru
Querétaro x Kenya
T. Supreme x 41-116 x Cameron
" " " x Baart 38
" " " x Ramona
" " " x Kenya
Tinstein x Harroqui
" x Baart 38
" x T. Supreme x 41-116
" x Pelón Colorado
" x Montana
Native Sel. x Tinstein
Native Sel. x Newthatch
CR.(T. Supreme x 41-116 x Kenya) x T. Supreme x 41-116
CR.(T. Supreme x 41-116 x Colorado Obregon) x T. Supreme x 41-116
CR.(Regent x Harroqui) x Regent

VI- Principle problems at Present:

- A- Better sources of Earliness.
- B- Better method of evaluating lines for resistance to shattering.
- C- Data on best generation for bulking selections.
- D- Need to begin preliminary quality tests "Dough bale type" of evaluation.
- E- Further work on developing a green manure crop for which wheat may serve as a nurse crop.
- F- Preliminary survey and study of aphid problem in the La Laguna, and wheat root insect in Sonora.
- G- Further study of agronomic phases of problem (See Dr. Chandler data)

- i.e.
- 1) Time of Planting
 - 2) Method of planting
 - 3) Rate of planting
 - 4) Rotations
 - 5) Fertilizers