

**DIRECTORATE OF ADVANCED STUDIES
EVENT CATALOGUE
2021**

7TH SEMINAR OF DAS EVENTS CALENDAR – 2021

**UTILIZATION OF ALIEN GENETIC DIVERSITY FOR
IMPROVING DROUGHT TOLERANCE IN BREAD WHEAT**



7th Seminar (Online through ZOOM) of DAS Events Calendar - 2021

**UTILIZATION OF ALIEN GENETIC DIVERSITY FOR IMPROVING
DROUGHT TOLERANCE IN BREAD WHEAT**

Presenter: Dr. Maria Khalid

Assistant Professor (IPFP) Institute of Biochemistry & Biotechnology

Thursday, 08th April, 2021 at 02:00 pm

ZOOM MEETING ID: 955 408 3170 - PASSCODE: 67890

Organized By: Directorate of Advance Studies, PMAS-AAUR

ACTIVITIES

CONTENTS

Food Security

Advancements in molecular markers

History of wheat improvements

Mutational analysis of drought tolerant gene

Germplasm Collection

Achievements



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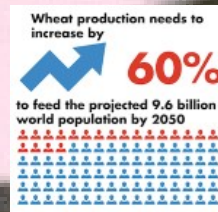
WHY WHEAT DEMAND IS GOING HIGHER?



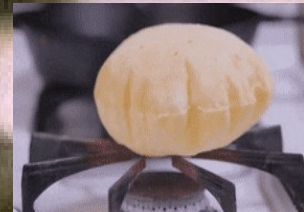
DROUGHT



POPULATION INCREASE



WHEAT DEMAND



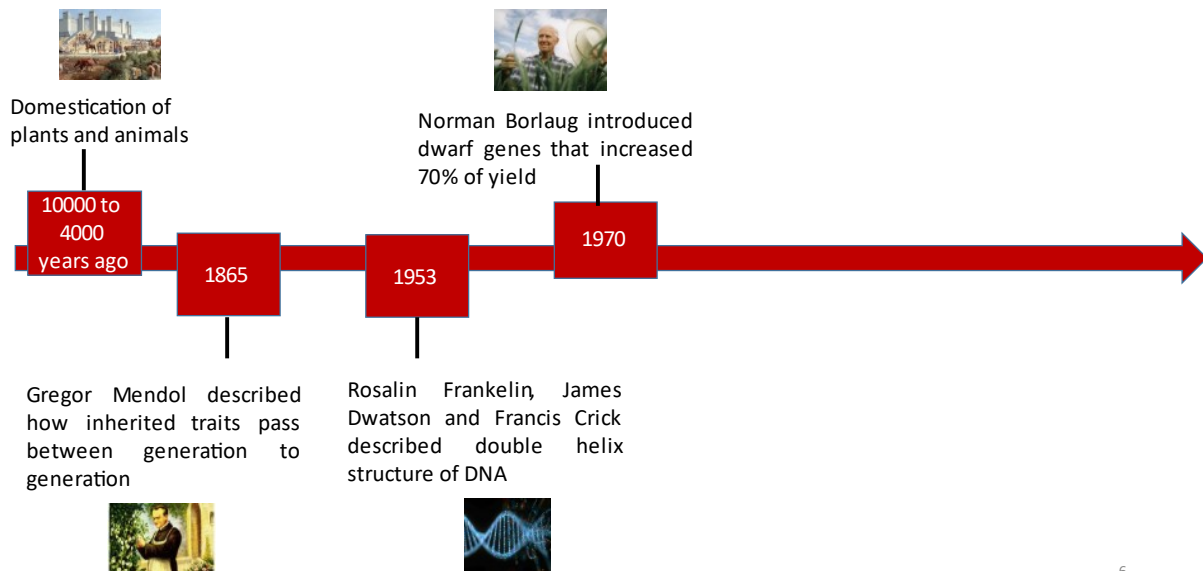
STAPLE FOOD



Exploring genetic diversity to improve wheat germplasm for drought tolerance



LONG HISTORY OF IMPROVEMENTS WITH LARGER IMPACTS





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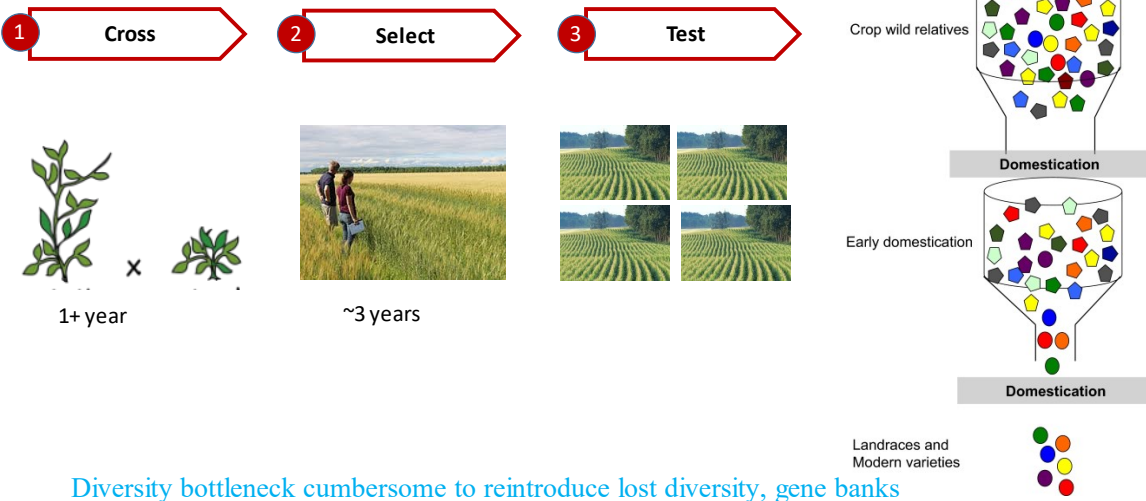


Hanson, H. (1982).

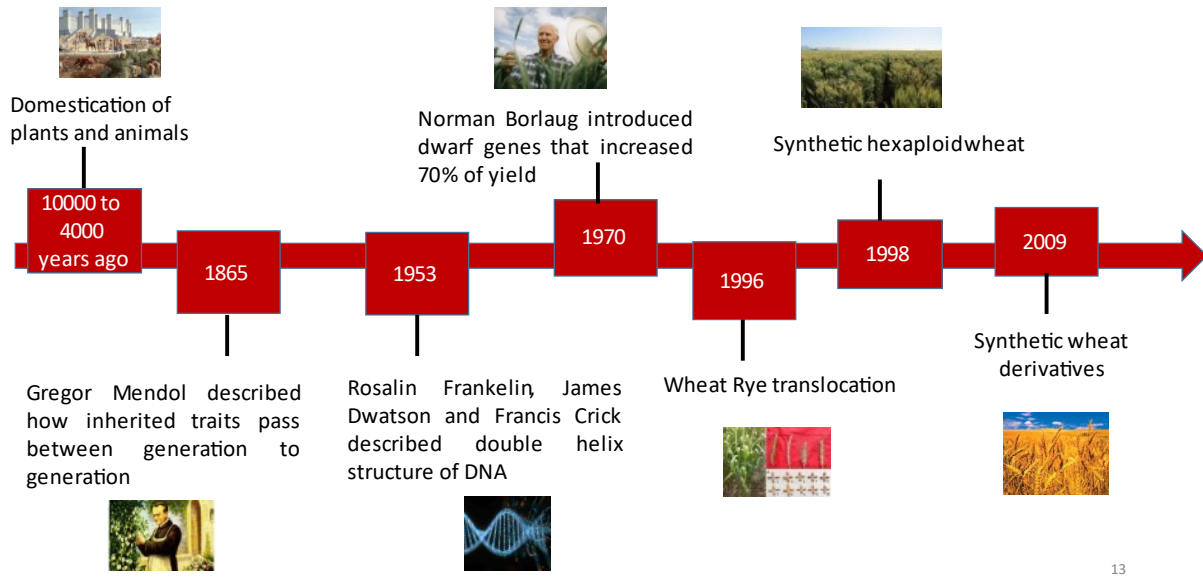
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TRADITIONAL BREEDING: TIME AND RESOURCE CONSUMING

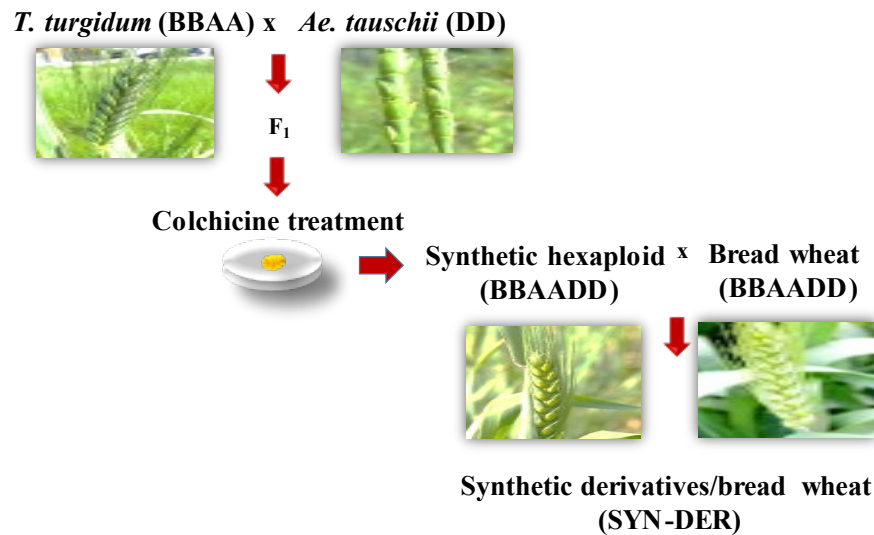


LONG HISTORY OF IMPROVEMENTS WITH LARGER IMPACTS



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SYNTHETIC WHEAT DERIVATIVES



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MOLECULAR MARKERS

- Neutral Markers
- Functional Markers

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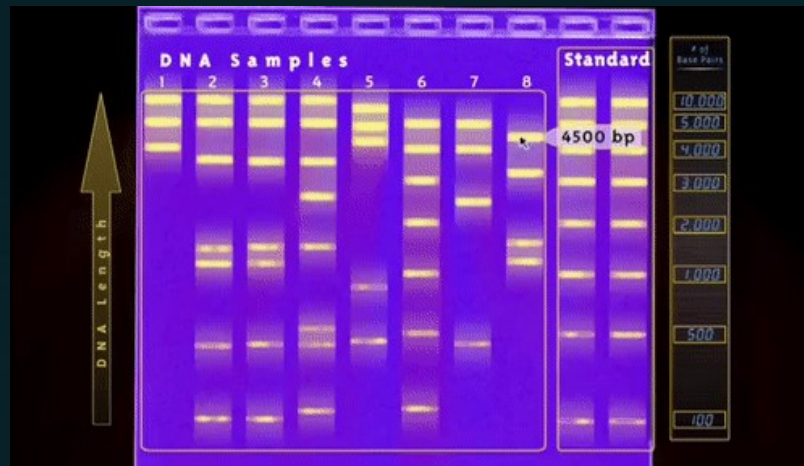
MOLECULAR MARKERS



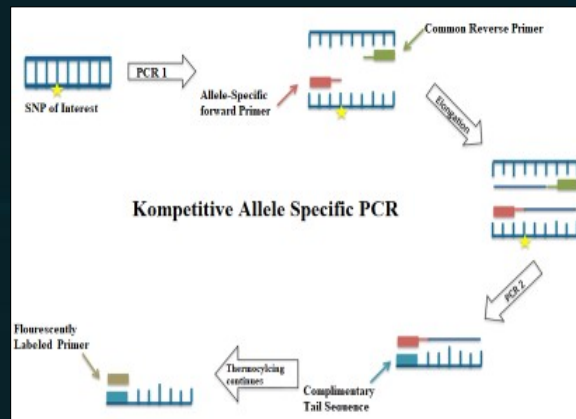
Gel Based Markers

- AFLP
- RAPD
- SSR
- SNP

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KASP vs GEL-BASED MARKERS

Parameters	Conventional PCR	SNPLine® KASP	
		384-plate	1536-plate
Data points (year)	0.1 m	9.2 m	36.8 m
QTL study (days/96 markers)	38-50days	2 days	1 day
MAS (samples/day/marker)	384	18K	73K
Cost	-	0.4 RMB	0.2 RMB
Person	1	1	1

Impact: More than 30 genetics and breeding programs all over the world are using

these KASP markers

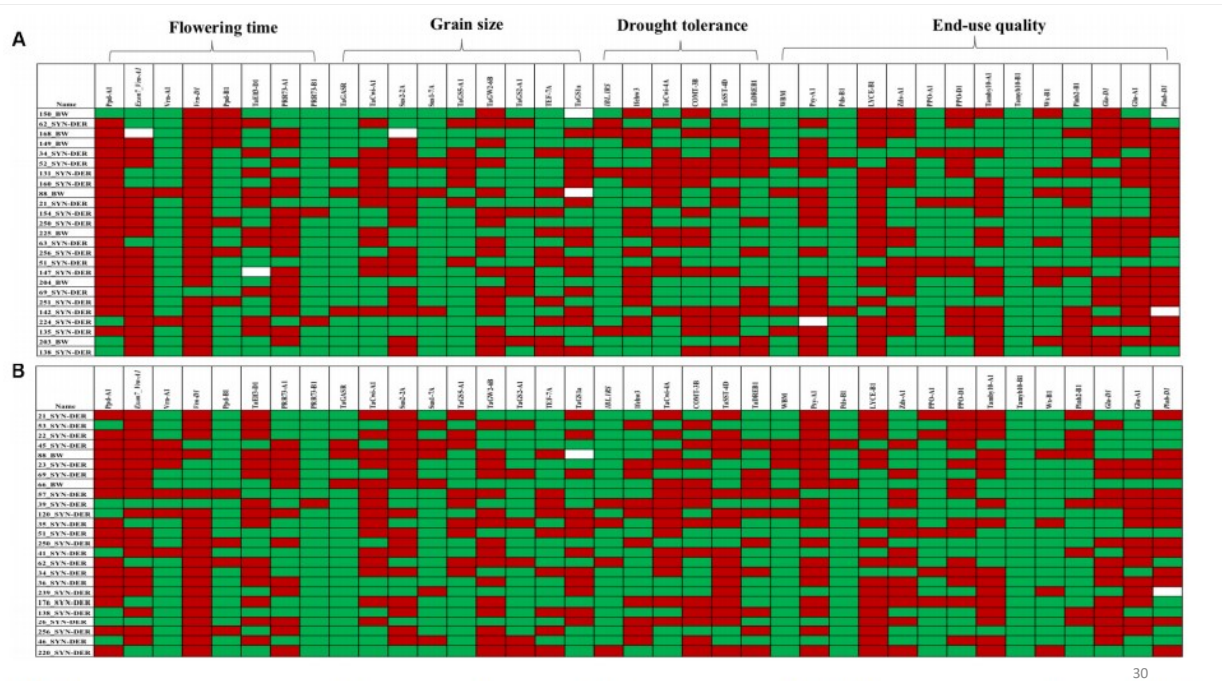
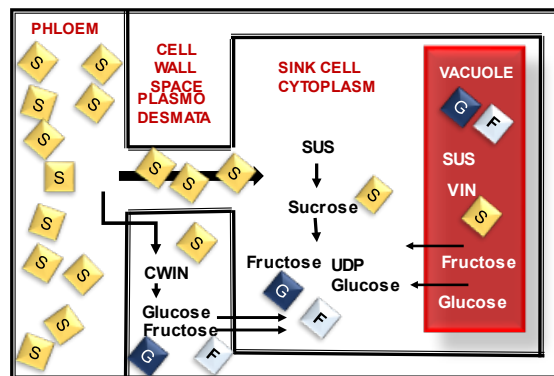


FIGURE 4 | Graphical genotyping approach to show favorable (red) and unfavorable alleles (green) in top 20 high-yielding accessions under well-watered (**A**) and

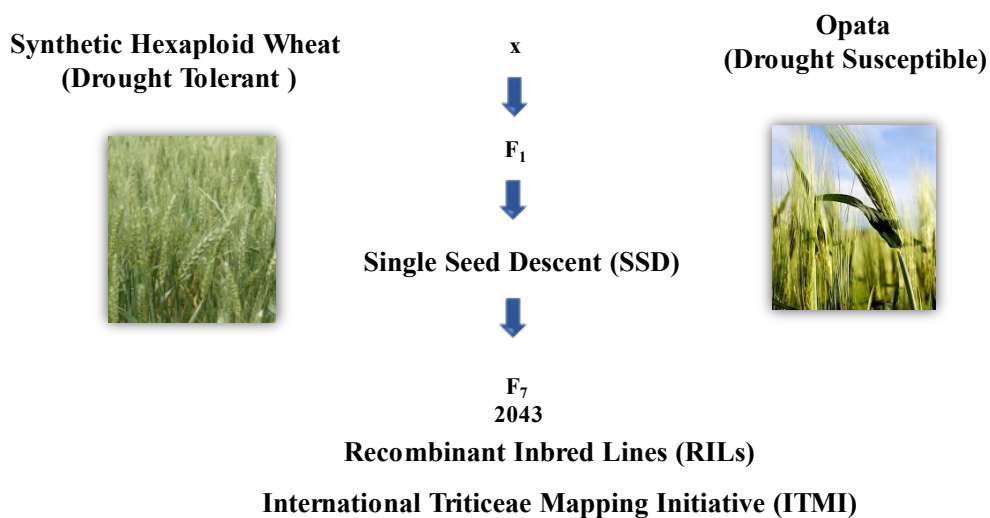
CELL WALL INVERTASE

- Cell wallinvertase (CW-INV)
- Source-sink relationship
- Reduces enzymatic activity under stress condition



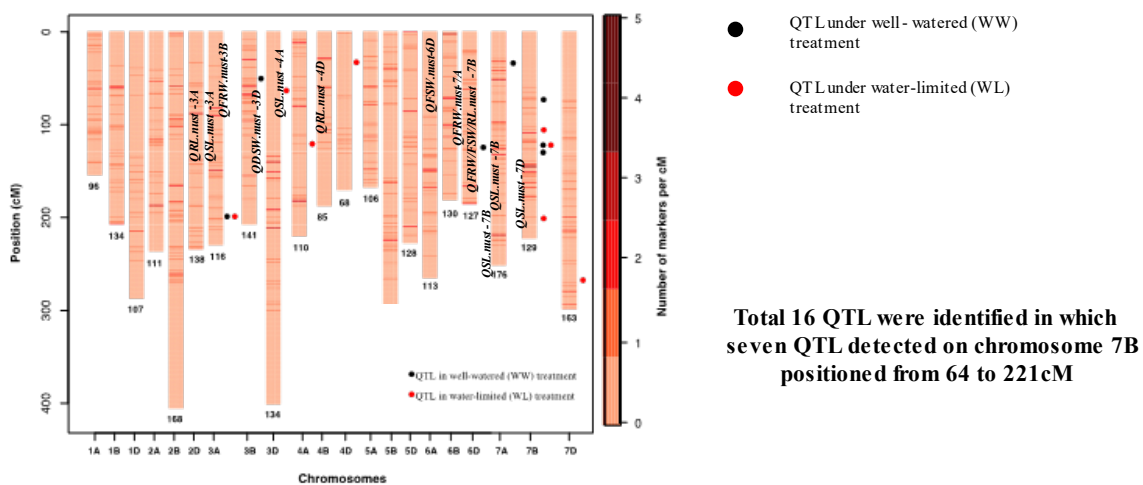
Cell wall invertase in phloem transportation. S= Sucrose; G= Glucose; F= Fructose; CWIN= Cell Wall Invertase; UDP Glucose = Uridine Diphosphate Glucose; SUS= Sucrose Synthase; VIN= Vacuolar Invertase

ITMI MAPPING POPULATION



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LINKAGE MAP OF ITMI POPULATION



Linkage map of Synthetic (W7984) and Opata RILs population (ITMI) using 2639 GBS markers

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CONCLUSIONS

- Beneficial alleles for genes were fixed in diversity panel with frequency ranging from 96.4-100%.
- Total 21 marker-traits were associated with agronomic traits under both moisture conditions
- Seven QTL detected on chromosome 7B were positioned from 64 to 221 cM.
- Non-Synonymous mutations were found in cell wall invertase *TaCwi-B1* particularly on the conserved domain i.e., WECPDF domain.

