Alfalfa to get back into planetary boundaries

2025 world alfalfa congress
FRANCE REIMS-CHÂLONS

Breeding rainfed alfalfa for Central Asia with less water

Jézéquel S. & Arcia Ruiz I.

Parallel Session 1 : Water management in alfalfa crops

FROM 03 › TO 06 nov. 2025

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FRANCE REIMS - CHÂLONS

New Alfalfa Variety “TOZIMDI”

Saltanat Toktarbekova

Developed by: **Kazakh Research Institute of Agriculture and Plant Growing (KRIAPG)**

FROM 03 TO 06 nov. 2025

The development of new variety Tozimdi improve alfalfa drought tolerance for Kazakhstan

Saltanat Toktarbekova , Serik Abayev, Galiolla Meiirman, Alan Humphries

КазНИИЗиР

Government of South Australia
Department of Primary Industries and Regions

SARDI
South Australian Research and Development Institute

CROP TRUST

Norway

The BOLD Program

Biodiversity for Opportunities, Livelihoods and Development

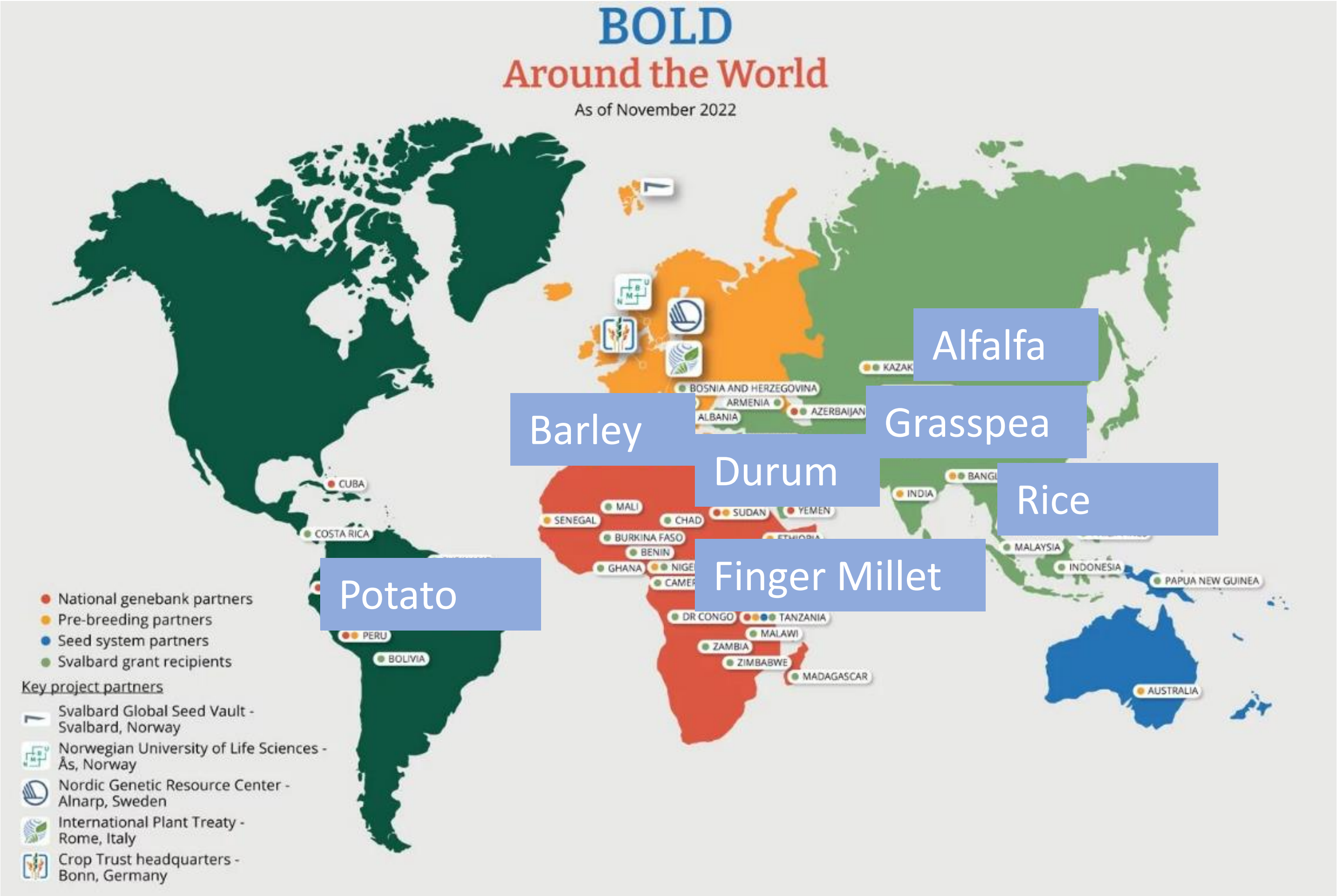
Strengthen food and nutrition security by supporting the conservation and use of crop diversity

USD 80M Government of Norway

10 years funding

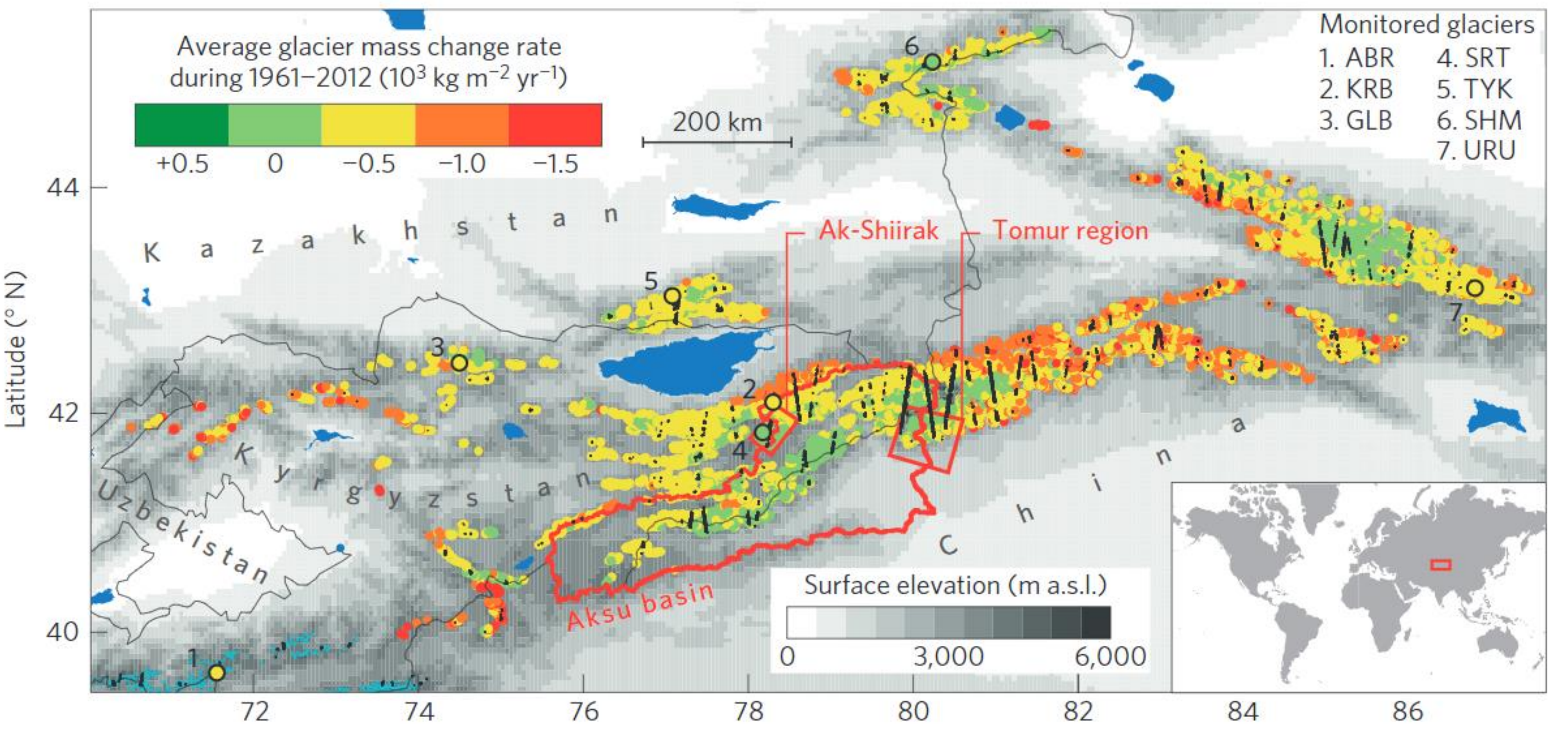
40+ Genebanks supported

52 Partner Countries



Norway | Food and Agriculture Organization of the United Nations | International Treaty on Plant Genetic Resources for Food and Agriculture | SVALBARD GLOBAL SEED VAULT

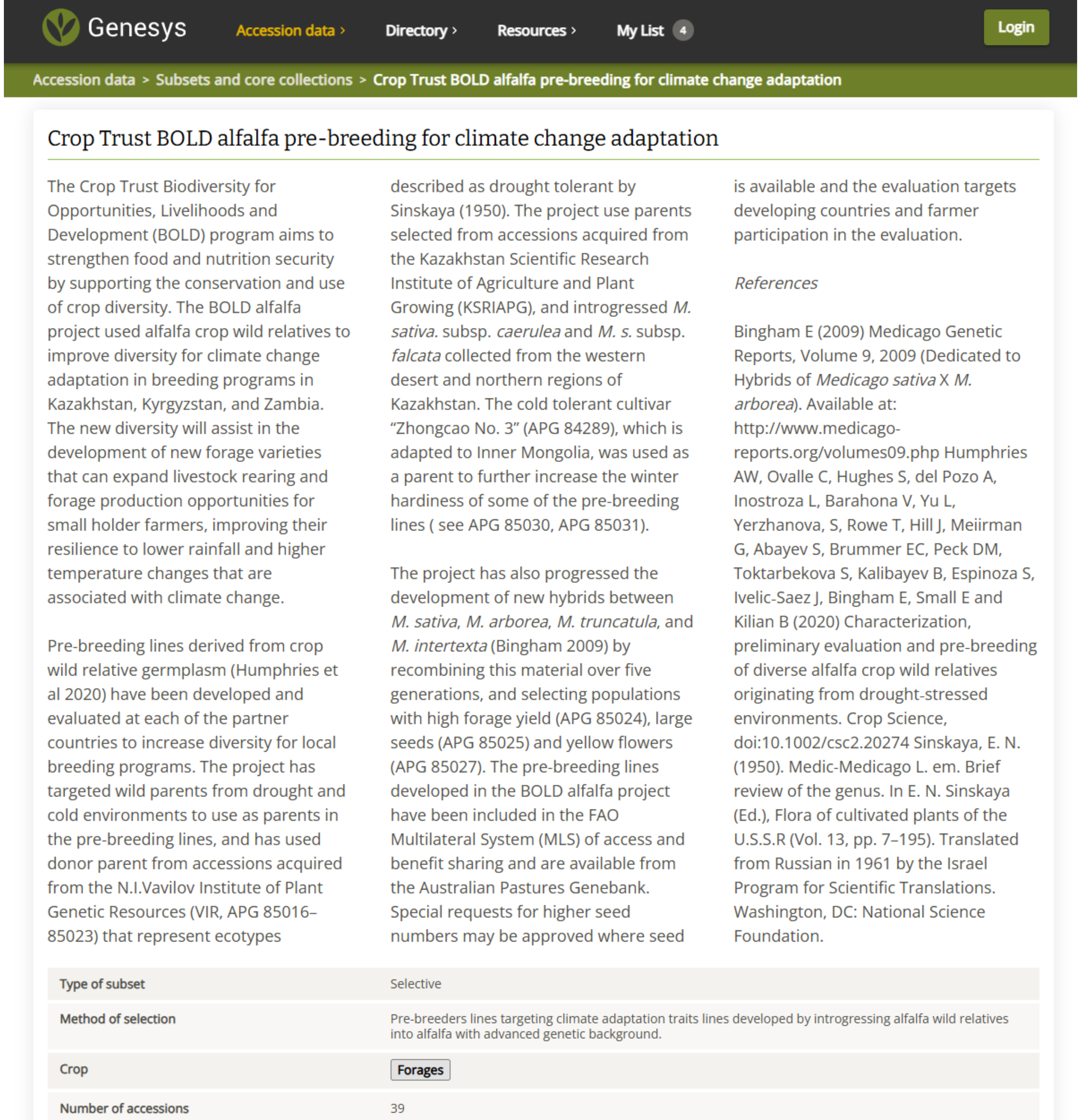
The problem of declining water resources



Source: Nature Geoscience, Farionotti 2015

Germplasm

The lines we evaluated are available from Genesys.



Genesys Accession data › Directory › Resources › My List 4 Login

Accession data > Subsets and core collections > Crop Trust BOLD alfalfa pre-breeding for climate change adaptation

Crop Trust BOLD alfalfa pre-breeding for climate change adaptation

The Crop Trust Biodiversity for Opportunities, Livelihoods and Development (BOLD) program aims to strengthen food and nutrition security by supporting the conservation and use of crop diversity. The BOLD alfalfa project used alfalfa crop wild relatives to improve diversity for climate change adaptation in breeding programs in Kazakhstan, Kyrgyzstan, and Zambia. The new diversity will assist in the development of new forage varieties that can expand livestock rearing and forage production opportunities for small holder farmers, improving their resilience to lower rainfall and higher temperature changes that are associated with climate change.

Pre-breeding lines derived from crop wild relative germplasm (Humphries et al 2020) have been developed and evaluated at each of the partner countries to increase diversity for local breeding programs. The project has targeted wild parents from drought and cold environments to use as parents in the pre-breeding lines, and has used donor parent from accessions acquired from the N.I.Vavilov Institute of Plant Genetic Resources (VIR, APG 85016–85023) that represent ecotypes described as drought tolerant by Sinskaya (1950). The project use parents selected from accessions acquired from the Kazakhstan Scientific Research Institute of Agriculture and Plant Growing (KSRIAPG), and introgressed *M. sativa*. subsp. *caerulea* and *M. s.* subsp. *falcata* collected from the western desert and northern regions of Kazakhstan. The cold tolerant cultivar "Zhongcao No. 3" (APG 84289), which is adapted to Inner Mongolia, was used as a parent to further increase the winter hardiness of some of the pre-breeding lines (see APG 85030, APG 85031).

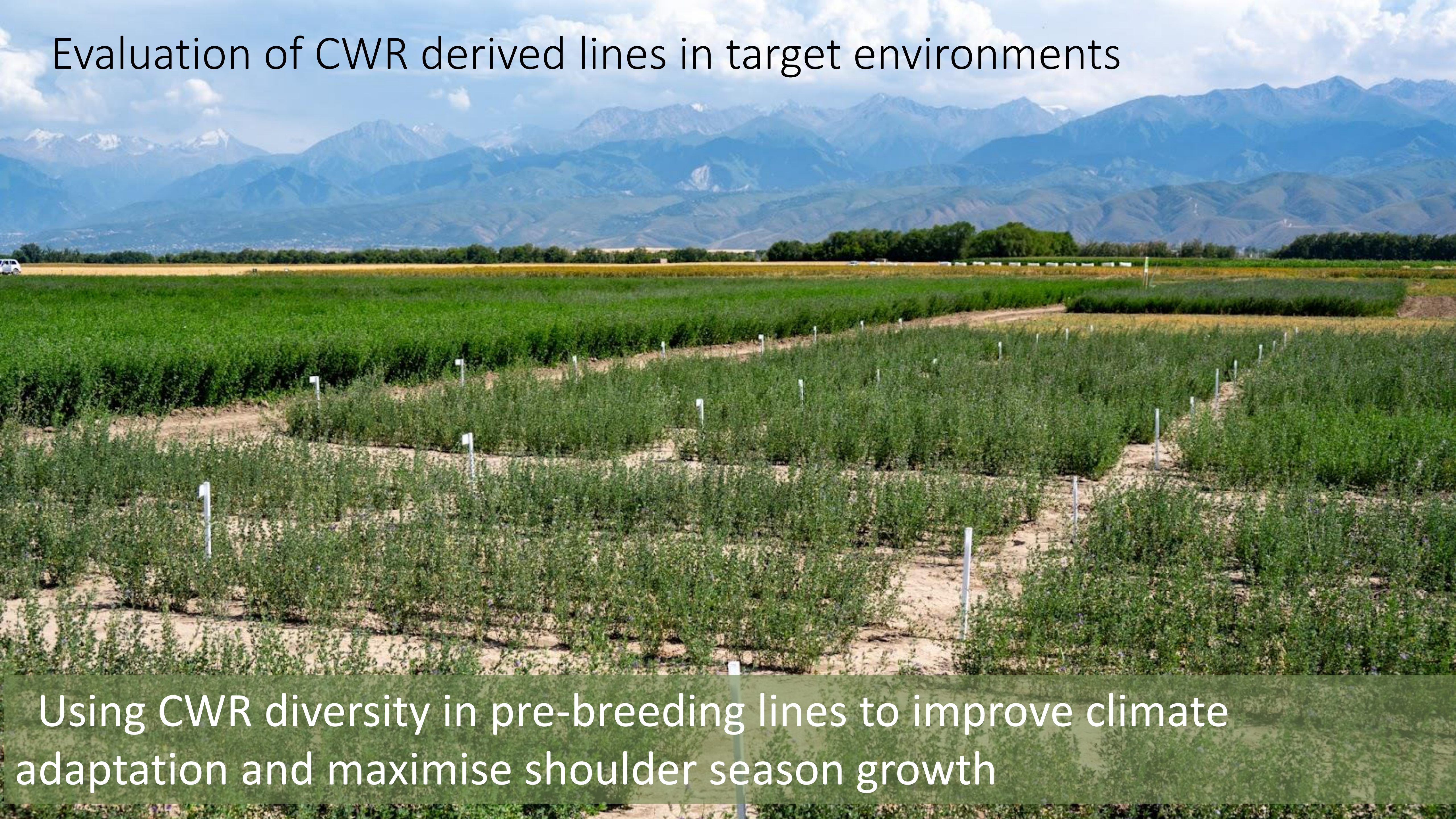
The project has also progressed the development of new hybrids between *M. sativa*, *M. arborea*, *M. truncatula*, and *M. intertexta* (Bingham 2009) by recombining this material over five generations, and selecting populations with high forage yield (APG 85024), large seeds (APG 85025) and yellow flowers (APG 85027). The pre-breeding lines developed in the BOLD alfalfa project have been included in the FAO Multilateral System (MLS) of access and benefit sharing and are available from the Australian Pastures Genebank. Special requests for higher seed numbers may be approved where seed is available and the evaluation targets developing countries and farmer participation in the evaluation.

References

Bingham E (2009) Medicago Genetic Reports, Volume 9, 2009 (Dedicated to Hybrids of *Medicago sativa* X *M. arborea*). Available at: http://www.medicago-reports.org/volumes09.php Humphries AW, Ovalle C, Hughes S, del Pozo A, Inostroza L, Barahona V, Yu L, Yerzhanova, S, Rowe T, Hill J, Meiirman G, Abayev S, Brummer EC, Peck DM, Toktarbekova S, Kalibayev B, Espinoza S, Ivelic-Saez J, Bingham E, Small E and Kilian B (2020) Characterization, preliminary evaluation and pre-breeding of diverse alfalfa crop wild relatives originating from drought-stressed environments. Crop Science, doi:10.1002/csc2.20274 Sinskaya, E. N. (1950). Medic-Medicago L. em. Brief review of the genus. In E. N. Sinskaya (Ed.), Flora of cultivated plants of the U.S.S.R (Vol. 13, pp. 7–195). Translated from Russian in 1961 by the Israel Program for Scientific Translations. Washington, DC: National Science Foundation.

Type of subset	Selective
Method of selection	Pre-breeders lines targeting climate adaptation traits lines developed by introgressing alfalfa wild relatives into alfalfa with advanced genetic background.
Crop	Forages
Number of accessions	39

Evaluation of CWR derived lines in target environments



Using CWR diversity in pre-breeding lines to improve climate adaptation and maximise shoulder season growth

”Alfalfa for livelihoods”

Multiple harvests & multiple end uses

- Dairy
- Beef
- Lamb and goat
- Eggs and poultry
- Fibre
- Hay
- Seed
- Honey

Local commodity not subject to international price fluctuations

Norway

CROP TRUST

Thank you for listening